VOL. V, No. 5 MAY, 1950

AGRICULTURAL CHEMICALS

In This Issue:

Here's what YOU want to know about Powco Brand Toxaphene

1. **POWCO BRAND TOXAPHENE DUST CONCENTRATES** are manufactured at our modern plant in Huntsville, Alabama, where new and up-to-date equipment assures a truly evenly impregnated dust.

2. **POWCO BRAND TOXAPHENE DUST CONCENTRATES** are free-flowing and dry. There is no "wet" dust, no balling up, no "bridging" in the hopper.

3. **POWCO BRAND TOXAPHENE** is also available in liquid 4, 6 and 8 lb. Emulsion Concentrates.

Both Powco Brand Emulsion and Dust Concentrates are manufactured to highest chemical and biological standards for full effectiveness in the field.

for high quality—
where it counts
... Look to Powell!

2,4-D AND INPC WEED KILLERS
DDT POWDERS AND LIQUIDS
BOTANICALS • ROTENONE • SABADILLA
PYRETHRUM POWDERS AND EXTRACTS
ALLETHRIN
STIMTOX A
CHLORDANE POWDERS AND LIQUIDS
BHC POWDERS AND LIQUIDS
COTTON DUST CONCENTRATES
TOXAPHENE POWDERS AND LIQUIDS
TETRAETHYL PYROPHOSPHATE
ANTU
AEROSOL FORMULATIONS
PYRISCENTS (Insecticide perfumes)
PYRINS
PIPERONYL BUTOXIDE CONCENTRATES

POWCO BRAND

KILLING POWER—THAT'S THE THING!

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Be Penny-wise and Pound-wise, too

...with ATTACLAY

YOU'RE penny-wise when you choose a carrier or diluent that cuts the cost of producing pesticide dusts. And you're pound-wise, too, when you select the material which serves to up-grade the quality of every pound of your product. You're *both* penny-wise and pound-wise when you specify Attaclay.

Attaclay's superior flowability keeps dust production moving at a faster pace. It accepts higher percentages of difficult-to-process toxicants. It stays dry and loose—permits mills to operate up to 50% longer between cleanings.

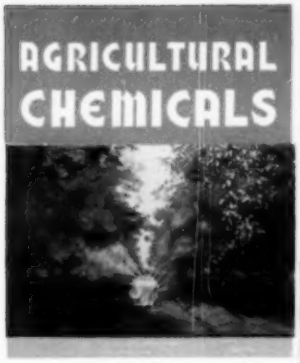
The fluidity of Attaclay-mixed dusts streamlines packaging operations. And months later, when packages are opened, your product is still loose and lump-free.

Attaclay's record of over-all compatibility is soundly established. Its low bulk density works to your advantage.

We invite you to put Attaclay to your most exacting tests. A generous free sample is yours upon request.

ATTAPULGUS CLAY COMPANY

Dept. P, 210 West Washington Square, Phila. 5, Pa.



THIS MONTH'S COVER

New style duster delivering insecticide in orchard. Dust is introduced into air stream beyond fan, which prevents collecting of material on blades. Machine, made by Ryder Mfg. Corp., made in 15,000 and 30,000 cfm models. Machine may also be attached to sprayer, making dual purpose applicator. (Photo courtesy Ryder Mfg. Co.)

MAY 1950
VOL. V No. 5

In This Issue:

A Monthly Magazine For the Trade

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LAWRENCE A. LONG
Editor

THOMAS MORGAN
Advertising Manager

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AGRICULTURAL CHEMICALS

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the call for
MULTIWALL
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FULTON
Fulton is now a recognized factor in the manufacture of quality Multiwall Paper Bags. Orders received from the largest users in many industries have been executed to the complete satisfaction of the buyers.
We are very proud of the confidence shown in our company by those who have favored us with orders for bags. We will spare no effort to continue producing the kind of bags that will keep these names on our books for many years to come.
Our new modern plant in New Orleans is equipped to produce all types of Multiwall Paper Bags. Give us a call on your next order.
Fulton BAG & COTTON MILLS
Atlanta • St. Louis • Dallas • Kansas City, Kans.
Denver • Minneapolis • New Orleans
Los Angeles • New York City
FULTON MAKES YOUR STYLE MULTIWALL PAPER BAG:
SEWN VALVE WITH TUCK-IN SLEEVE . . . SEWN VALVE . . . SEWN VALVE WITH L.C. SLEEVE . . .
PASTED VALVE . . . PASTED OPEN-MOUTH . . . SEWN OPEN-MOUTH

THE extra assurance shippers feel in doing business with the world's largest pulp-to-bag plant is one of the reasons that doors open for the Union Multiwall Specialist.

Union's complete integration, from vast forest resources to finished bag, insures consistent quality, dependable service and fair price.

So when your Union Multiwall Specialist calls, hear his story. Whether you are now packing in multiwall bags or not, he has resources at his command that could be of real value to you.


Multiple Protection


Opens Easily


Prevents Siftage


Empties Clean

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UNION Multiwall Bags

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GROWERS CONFIRM RESEARCH ENDORSEMENTS OF PARATHION INSECTICIDES

Outstanding Results on Fruits, Vegetables

Widespread commercial use of parathion insecticides confirms the very satisfactory findings of a three-year research program on THIOPHOS® Parathion, the remarkable ingredient of these powerful new insecticides.

In one section of California, where whiteflies on pole beans presented a serious problem, a dilute dust containing parathion was the most effective for whitefly control. Arizona growers report excellent control of stink bugs on tomatoes, and from Texas comes the report, "I have used parathion and it gives wonderful results on aphids and squash bugs and beetles."

A New Hampshire fruit grower tells of excellent control of budmoth and red mite with parathion wettable powder; and from an Oregon orchard comes the report, ". . . at time of application the leaves were red with eggs of red spider. Excellent kills were obtained with this spray . . ."

Vegetable growers and orchardists in all parts of the country continue to supplement these reports with their own remarkable findings on the value of parathion insecticides.

Note dramatic contrast between Anjou pear tree at left, which was treated with THIOPHOS Parathion insecticides, and tree at right which was untreated and was defoliated by pear psylla.

Thiophos Parathion Insecticides made by National Manufacturers

Insecticides made from THIOPHOS Parathion are available in dust and wettable-powder formulations from reputable manufacturers.

Weather, Timing, Method of Application Important Factors In Successful Use of Parathion

To profit fully from the efficiency of parathion as a pest killer, farmers and fruit growers are being urged by Federal and State agricultural experts to observe carefully the manufacturers' instructions for applying parathion to specific crops. Such factors as weather, timing in relation to the development of the crop and insects, and method of application are known to be just as important as the correct dosage in achieving best results. For this reason, users are advised to consult with local agricultural experts or manufacturers' representatives to be sure of getting the most complete pest control and crop protection with this remarkable insecticide.

Use Parathion Safely

Any insecticide toxic to insects is also hazardous to humans if used carelessly and in defiance of certain common-sense precautions.

These precautions are stated explicitly on every container of parathion insecticides. They must be read carefully and observed strictly to avoid accidents.

It is urged that work crews who are given parathion to apply be fully advised also of the necessity of observing these precautions.

Be sure to write for Growers' Manual on Parathion

AMERICAN Cyanamid COMPANY

Agricultural Chemicals Division

32-D ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Please send me Growers' Manual giving latest recommendations for using Parathion.

Name _____

Address _____

_____

FARM PORTRAIT NO. 5

Better Farm Buildings for Better Farming

The over $15,000,000,000 valuation set on our farm buildings today, is a striking measure of their importance in our national economy. But an even greater investment in modern farm buildings will return handsome dividends.

Another most profitable investment will be found in the more generous use of the correct types of farm fertilizers. Many of the most effective of these are compounded with potash—often with Sunshine State Potash, a product of New Mexico, and a soil nutrient which provides increased soil fertility and greater resistance to disease and drought. Here is a sure corner-stone on which to build for increased productivity.

Reg. U. S. Pat. Off.

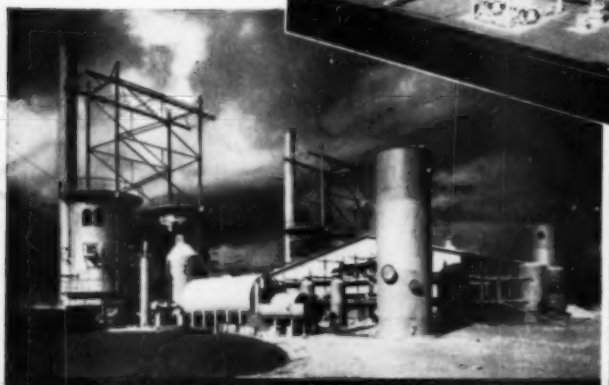
HIGRADE MURIATE OF POTASH
62/63% K_2O
GRANULAR MURIATE OF POTASH
48/52% K_2O
MANURE SALTS 20% MIN. K_2O

UNITED STATES POTASH COMPANY, *Incorporated*, 30 Rockefeller Plaza, New York 20, N. Y.

Progress Report by Chemico

LARGE FERTILIZER PROJECT FOR EGYPT

Model of fertilizer works built before project was initiated



Gas reformers to convert refinery gas to hydrogen and nitrogen

Local craftsmen placing reinforcing steel for foundations

Nitric acid absorption towers and ammonia storage tanks

General view of the project which covers an area of 1350 acres

These photographs show work in progress on the 550-ton per day fertilizer plant being built at Suez, Egypt. This important Chemico project includes plants for the production of synthetic ammonia, nitric acid and calcium nitrate together with complete facilities for supplying utilities such as power and water to the various units. This is one of a number of world-wide Chemico activities which include projects in Formosa, India, Mexico, South Africa and Brazil. Whatever your problem may be in the production of heavy chemicals ... wherever it may be ... you can be sure that Chemico will deliver a highly efficient plant on a guaranteed-performance basis.

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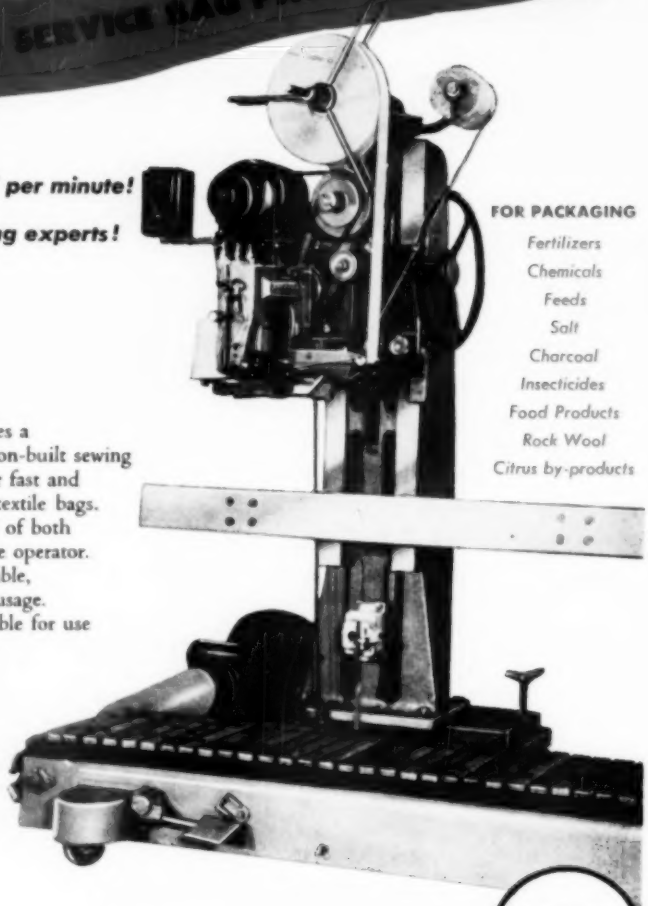
Chemico Plants are Profitable Investments

A MAKER OF MULTIWALL BAGS

knows how

TO DESIGN AND SERVICE BAG PACKING MACHINES

- ***High Speed Closing—up to 15 per minute!***
- ***Trouble-free—designed by bag experts!***
- ***Long Life—built to last!***



FOR PACKAGING

Fertilizers
Chemicals
Feeds
Salt
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NEW ET BAGPAKER

Semi-automatic—self-contained. Applies a sewn-thru "Dry Tape" closure. Precision-built sewing head is synchronized with conveyor for fast and fool-proof closing of either paper or textile bags. Foot-pedal provides convenient control of both sewing head and conveyor. Easy on the operator. Permits *more* production per day. Portable, heavy duty, built for hard continuous usage. FT Bagpaker, without conveyor, available for use with existing conveyor systems.

write for booklet today

For full information, ask for booklet 200D entitled: "Quick Facts on Bagpak Machinery and Bagpak Multiwall Bags."

This famous "Cushion Stitch" absorbs strains, won't pull out, yet provides an easy-to-open closure.

INTERNATIONAL PAPER COMPANY

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BAGPAK DIVISION
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IN CANADA: Canadian Bag Products, Ltd., Montreal, Ottawa

Will it be corn or weeds to brush the farmer's knee on the Fourth of July? The application of Monsanto 2,4-D is the *easy* and *sure* way to make it corn.

One application of properly formulated Monsanto 2,4-D and broad-leafed weeds wither and die while corn remains to thrive. Better stock up *now* with Monsanto 2,4-D. If you're out of stock you'll miss weed-killer profits. Farmers can't wait!

Monsanto will make prompt delivery of 2,4-D in any of the following forms: Fine, white powder, assaying approximately 99.0%; as isopropyl ester, a pale-yellow liquid, assaying 99% or better; as sodium salt, a white powder assaying (as monohydrate) approximately 97.0%.

For further information, use the coupon or contact the nearest Monsanto Sales Office. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1766-E South Second Street, St. Louis 4, Missouri.

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

MAIL COUPON FOR DATA on Monsanto Emulsifiers and Wetting Agents. Ask for new Technical Bulletin No. P-142.

X MONSANTO HERBICIDAL CHEMICALS

2,4-D ACID
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TRICHLOROBENZENE, Technical
NIPOS*-T (Tetraethyl Pyrophosphate, Tech. For agricultural use only)
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*Reg. U. S. Pat. Off.

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MONSANTO CHEMICAL COMPANY
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Please send, without cost or obligation, material indicated:

..... Information on Monsanto 2,4-D; ... Information on ..... ; Bulletin P-142.

Name ..... *Title* .....

Company .....

Street .....

City ..... *Zone* ..... *State* .....

SERVING INDUSTRY . . . WHICH SERVES MANKIND

No flies on me

"No sir, not since the boss started using that new spray with CRAG Fly Repellent in it. It sure keeps the flies off."

If our friend the cow could talk that's what you'd probably hear. But not being a chemist or a fly spray formulator, she couldn't tell you all the rest. She doesn't know that CRAG Fly Repellent is a synergist for pyrethrum and allyl cinerin as well as a repellent, and that it is—

- safe to use on dairy stock
- colorless, odorless
- compatible with most toxicants
- easy to formulate
- not hazardous to humans and animals

AND WILL REPEL—

- Stable Flies
- Horn Flies
- Black Flies
- House Flies
- Horse Flies
- Midges

"Crag" is a registered trade-mark of Union Carbide and Carbon Corporation.

For test samples or for technical information, please send the coupon below.

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AGRICULTURAL CHEMICALS

Carbide and Carbon Chemicals Division
Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

Gentlemen:

Please send me, without obligation, an 8-oz. sample and technical information on CRAG Fly Repellent.

Name.....

Company.....

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City.....Zone...State.....

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5 reasons why the STA-STAK® MULTIWALL BAG is better

1. **PREVENTS SHIFTING IN CARS**
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3. **EASIER TO HANDLE**
4. **GREATER RESILIENCY AND ADDED STRENGTH**
5. **MAKES PALLETIZED SHIPMENTS WORK**

STA-STAK multiwall bags stay stacked because of the specially designed outer creped sheet. Perfected in our packaging laboratory, it's another A&S exclusive feature.

STA-STAK bags are crinkled on the outside but smooth on the inside . . . the sleek inside sheet of No. 1 specification kraft guarantees that STA-STAK bags pour clean without retaining valuable material.

The STA-STAK multiwall bag is made in both the sewn open mouth and sewn valve style from four to six ply construction with the STA-STAK outer creped sheet. Write today to our office in Canajoharie, c/o Packaging Engineer, for sample bags to make your own handling, piling and shock tests.

ARKELL & SMITHS · THE OLDEST NAME IN PAPER BAGS ·
90 YEARS OF KNOW HOW

ARKELL and SMITHS

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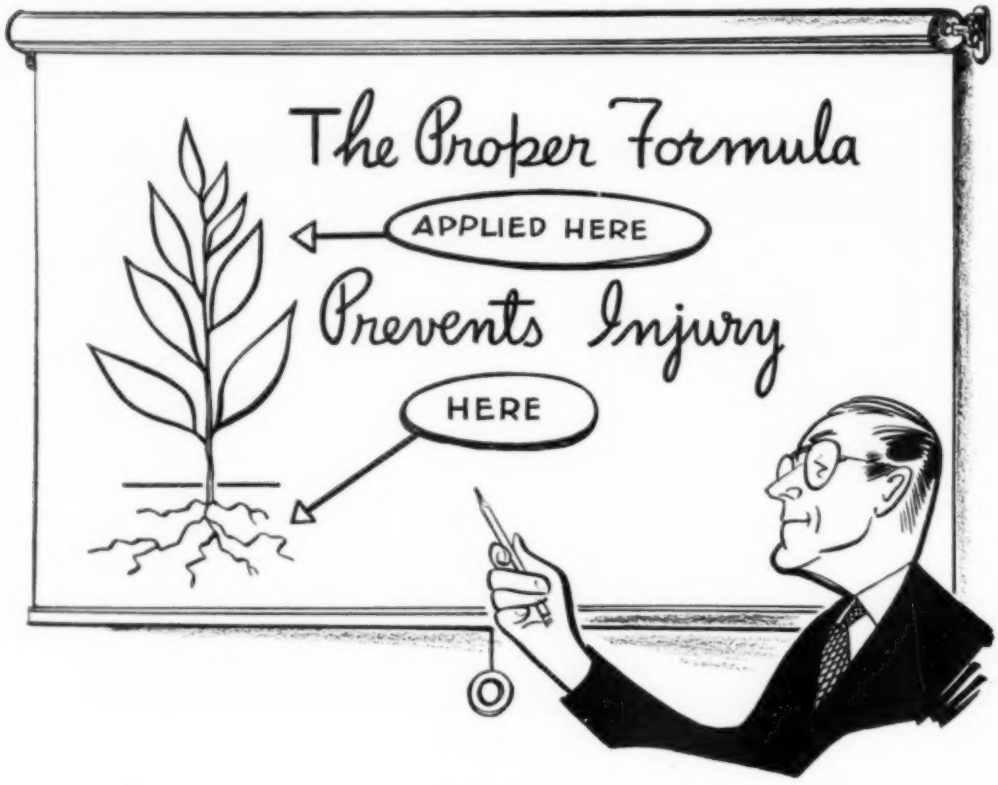

THIS PLANT is a poor producer. Yet it is free of insects and disease—apparently a healthy plant in all respects. What went wrong?

Maybe there was too much emulsifier—or the wrong kind of emulsifier—in the insecticide used. This could easily result in excessive "run-off" from the foliage into the soil where certain toxicants can injure the plant roots.

To help prevent troubles like this, formulators depend on Atlas emulsion service to keep them up-to-date on the latest developments in emulsion technology. Take advantage of this service to help solve *your* emulsion problems.

As a starter, write today for the new Atlas pamphlet featuring Atlox 1045-A, Atlas G-1256, and other versatile Atlas emulsifiers in twenty-six formulas for agricultural, pesticide, and animal-dip applications. Typical formulations are shown for use with chlordane, toxaphene, BHC, DDT, piperonyl compounds, 2,4-D, and other active ingredients.

Atlox Reg. U. S. Pat. Off.

ATLAS INDUSTRIAL CHEMICALS DEPARTMENT

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Here's how this *Customized*

Baughman

BULK HANDLING EQUIPMENT

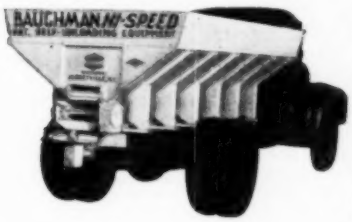
Makes more money for you

Sell for less — eliminate bagging by handling in bulk and delivering in bulk. It's the most practical, the most efficient way to handle commercial fertilizers.

BAUGHMAN Equipment gives you automatic material flow direct from car to storage bin or hopper bin . . . from storage bin to hopper bin for delivery. Cuts man hours to the minimum.

LOW COST. Build your Belt and Bucket Elevator (right) from standard 10′ sections . . . eliminate the expense of a custom-built installation. All Baughman equipment is economically produced by assembly line methods for further savings. Ruggedly built of alloy steel for long life.

MODEL Q SCREW CONVEYOR loads and unloads cars and trucks quickly and efficiently — the perfect teammate for the Belt & Bucket Elevator! Big 9" conveyor screw gives up to 40 bu. per minute capacity from the horizontal to 30°. Available with or without wheels.



MODEL K . . . the famous self-unloading body used by commercial operators the world over to spread lime, phosphate and other materials. Spreads large volumes at high speed. Built of high tensile alloy steel for more strength with less weight—MORE PAYLOAD!

Available with sprayer attachment to prevent wind loss and hold the spread to the ground . . . also specialized rock phosphate spreading attachment.

SUPERPHOSPHATE TRANSPORT gives high speed, low cost bulk handling. Effectively hauls and unloads superphosphate. Waterproof roof can be installed. Baughman also builds bodies for rock phosphate, limestone and other commercial fertilizers. A model for your every need.

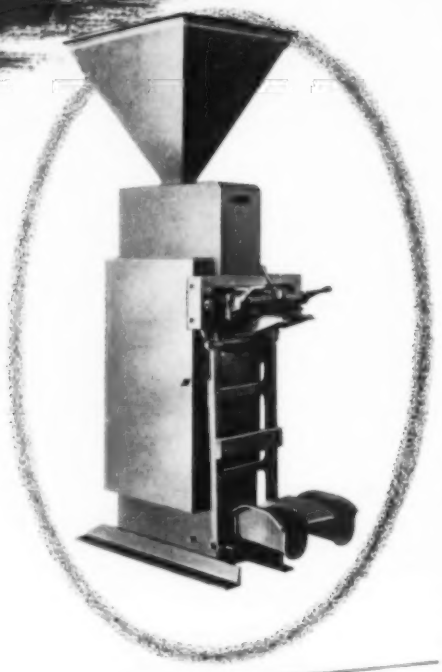
WRITE . . . for complete details

BAUGHMAN MANUFACTURING . CO., Inc.

151 SHIPMAN ROAD JERSEYVILLE, ILLINOIS

"The Pioneers of the Lime Spreading Industry"

NEW



a St. Regis filling machine designed, engineered and **PRICED** for the smaller fertilizer plant!

Here's the *newest* in efficient fertilizer packing—the 325-PB—a low-cost, thoroughly tested St. Regis Packer specifically designed for plants whose volume does not require a large capacity packaging machine.

The 325-PB is a centrifugal belt packer that incorporates many of the outstanding features of the larger capacity St. Regis 160-FB. Its output in actual operation averages 18 to 24 tons per hour. It requires *only one man to operate*, cutting your labor cost. It fills a better, more protective package—a St. Regis Multiwall Paper Bag. *And* it gives you the same rugged dependability that larger St. Regis machines do—*at a price in keeping with your plant's needs.*

For full details and specifications on this new, practical packaging machine, ask your nearest St. Regis Sales Office about the 325-PB.

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YOU BUY PROTECTION WHEN YOU BUY MULTIWALLS

Apple production "up" 10 to 15%!

NEW—

16% Parathion Water Miscible

A new Pittsburgh product—a liquid concentrate specifically for the control of greenbugs on grain.

Other

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2,4-D Acid **2,4-D Isopropyl Ester**
2,4-D Secondary Butyl Ester
2,4-D Amine Concentrates
2,4-D Ester Concentrates
Dinitro Ortho Cresol (DNOC)
Parathion—Technical
Parathion—Wettable Dust Concentrates
Parathion—Dry Dust Concentrates
2,4,5-T Isopropyl Ester
2,4,5-T Ester Concentrates
10-20 Brush Killer
Alpha Naphthyl Thiourea (ANTU)
Isinol-D **Sodium Arsenite**
Benzene Hexachloride (BHC)

Pittsburgh Parathion helps do this job!

The bumper crop and fine quality of fruit from the great apple belts last year was due in part to the first really widespread use of Parathion, for this most potent insecticidal chemical yet developed not only destroys the European red mite and other arachnids but appears to be an effective control for a wider range of orchard insect pests than many previously used compounds.

Pittsburgh Agricultural Chemical Company is a basic producer of Parathion and offers *Pittsburgh* 15% and 25% Parathion Wettable Powders, chemically and biologically standardized.

Now is the time to assure your season's supply of this orchard-proved control chemical. For technical assistance and recommendations, write today.

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Division of

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INDUSTRY FORUMS

Forums for free and open discussion of current and future problems and opportunities are provided for members by the National Agricultural Chemicals Association during its semi-annual meetings.

Recently more than two hundred Industry representatives, attending the Spring Business Meeting, participated in forums devoted to: The Residue Tolerance Hearing, legislation, and regulations. The varied analyses and viewpoints expressed serve to keep members abreast of developments and promote continued Industry progress.

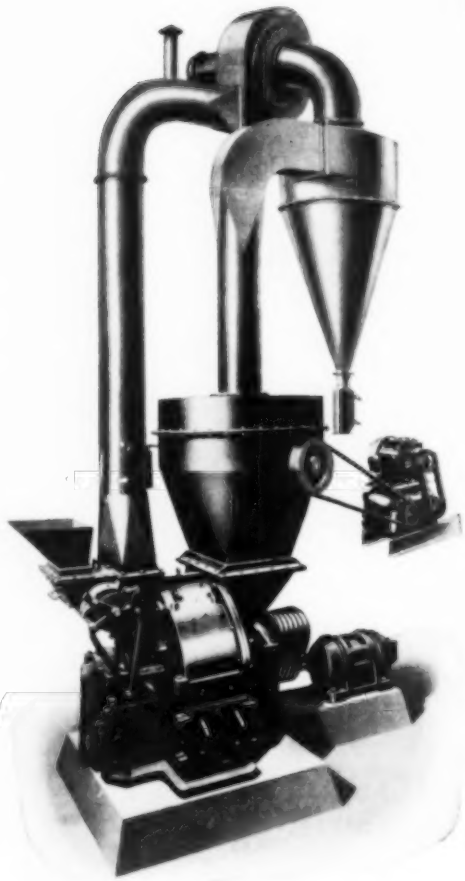
The semi-annual meetings are an important part of NAC's services to members, which also include digests of daily testimony of the Residue Tolerance Hearings.

Membership in NAC is an investment that pays!

FOR PRODUCTION

. . . of High Quality Thoroughly Blended

INSECTICIDE MIXTURES



RAYMOND WHIZZER EQUIPPED

IMP MILL

GRINDING · BLENDING · CLASSIFYING

The Raymond Imp Mill has proven a clean, flexible installation for the grinding and intimate blending of insecticides with recommended fillers for small and medium size plants.

Fine, fluffy, finished products, excellent for field and dusting purposes are produced with this unit, using thirty to fifty per cent DDT, BHC, Toxaphene and similar insecticides.

The unit has no screens to clog or wear out and, because of the air cooling and conveying system, considerably lower temperatures are encountered than with a screen mill.

This unit may well be the answer to your insecticide production problem. Write for Imp Mill Catalog, and tell us the requirements of your job.

SINCE 1887

COMBUSTION ENGINEERING-SUPERHEATER, INC.

Raymond

PULVERIZER DIVISION

1314 North Branch St.
Chicago 22, Illinois

The Work Horse in the packaging field

BEMIS

MULTIWALL

PAPER

SHIPPING

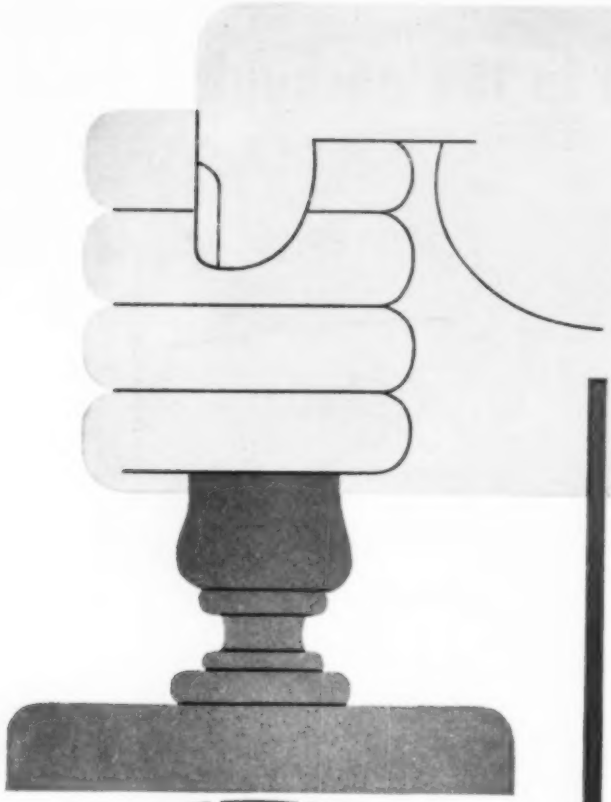
SACKS

They're tough and sturdy . . . have plenty of reserve strength even when packed with such heavyweights as cement or fertilizer.

Bemis uses top quality kraft paper. Each of the three or more plies has been tested for the kind of work it must do. So, there is never any question. It's sure to do the job.

Seven Bemis Multiwall Plants are ready to team up to give you service in an emergency or to provide a dependable source of supply.

Bemis



APPROVED

toxaphene

More detailed information summarizing current federal or state recommendations for the control of these pests is available from:

HERCULES POWDER COMPANY

970 Market Street, Wilmington 99, Delaware

MAKERS OF TECHNICAL TOXAPHENE FOR AGRICULTURAL INSECTICIDES

Toxaphene Will Kill These Pests

ALFALFA WEEVIL
ARMYWORMS
ASTER LEAF MINER
BEEF CATTLE LICE
BEEF CATTLE TICKS
BLISTER BEETLES
BOLL WEEVIL
BOLLWORM
CHINCH BUG
COTTON APHID
COTTON FLEAHOPPER
COTTON LEAFWORM
FALL ARMYWORM
GARDEN WEBWORM
GOAT LICE
GRASSHOPPERS
GREEN CUTWORM
HOG LICE
HORN FLY
LEAFHOPPERS
PEAR PSYLLA
RAPID PLANT BUG
SALT-MARSH CATERPILLAR
SERPENTINE LEAF MINER
SHEEP TICK
SOUTHERN GREEN STINK BUG
SPITTLEBUG NYMPHS
SUGAR BEET WEBWORM
SWEET CLOVER WEEVIL
TARNISHED PLANT BUG
THRIPS
TOBACCO BUDWORM
TOBACCO HORNWORM
TOMATO HORNWORM
TOMATO PINWORM
VELVETBEAN CATERPILLAR

THE EDITOR COMMENTS

FREQUENTLY in the past, we have pointed out damage done to the pesticide industry through frightening news stories overemphasizing hazards and neglecting to mention necessary safeguards and benefits derived from use of economic poisons. Another example appeared recently in a usually reliable New York journal. The article implied that use of DDT and BHC will "poison" soils. Consisting of facts stripped of their context, the article was misleading and "very poorly presented," according to USDA officials. It emphasizes again how important it is for the industry to counter these stories with well-balanced information on correct use of pesticides.

CONSIDERABLE credit should go to members of the National Agricultural Chemicals Association who have shouldered the rather heavy financial burden of disseminating to much of the trade, information about the current Food and Drug Administration toxic residue hearings. It appears to be a case where the Association, being the most logical organization to boil down the thousands of pages of testimony into easily comprehended summaries, has done an excellent job for the whole industry. And, as is inevitable, benefit has accrued to companies both within and without the organization . . . which means that the relatively few carry the financial load for the whole.

Not that we should expect anyone to do much about it, but it does seem appropriate to cite the NAC Association for work well done in the efficient handling of a difficult and complex task. Specific information telling what the hearings were all about was of great importance to the entire industry when the procedure was getting under way; it is of equal importance now, while industry is presenting its testimony. It seems only fair that industry people should know where much of the information comes from. NAC members know, of course . . . they're footing the bill!

IN a decision charging the government with responsibility for lack of adequate precautions in handling and shipping ammonium nitrate, which resulted in the disastrous fire and explosion in Texas City three years ago, Judge Kennerly in the Federal District Court at Houston, Texas, calls this material much too dangerous for safe fertilizer use.

We question strongly that the facts justify any such conclusion. For twenty-five years before the Texas City disaster, ammonium nitrate had been shipped all over the world without serious accident. Tests by the Army following the Texas explosion confirm that ammonium nitrate is not an unduly hazardous material to handle and ship. Such hazards as have been disclosed seem to apply only when the material is confined in the hold of a vessel. No explosions have been reported where the material was on land or being shipped by rail.

That sabotage may logically be suspected as a possible cause of the Texas City disaster is the belief of some army personnel long associated with the production and shipment of ammonium nitrate. They point out that the three ships involved in the explosion in 1947 were all French and were transporting nitrate for use in France. Communist activities, designed to create trouble for the French government, might explain this rather strange coincidence, they feel. If there is such a possibility, this angle should of course be investigated thoroughly before stringent regulations are adopted governing ammonium nitrate, which might seriously impede its use.

An Expert Discusses

Toxicity of Cotton Insecticides

INSECTICIDES are essential to the profitable production of cotton. In fact, without their proper use, the fate of our 2¾ billion-dollar cotton crop is in grave doubt. The several score of cotton pests, headed of course by the notorious boll weevil, assess an annual tax on the cotton farmers of some 400 million dollars. Probably not more than 10 percent of the cotton acreage is treated with insecticides, but the treated acres are usually those that are suffering most from insect depredation.

With the intelligent and persistent use of insecticides, phenomenal yields of cotton have been reported this year in many parts of this country, even in the face of the most severe boll weevil infestation in the last 22 years. In numerous instances, increased yields of over a bale per acre have resulted from the use of insecticides. But the heavy application of insecticides is not without its hazards, however.

It is not the purpose of this paper to discourage the employment of insecticides in fighting cotton pests, but rather to point out hazards, real and potential, in their *misuse*.

Here are some of the hazards that must be avoided:

1. **Acute or chronic poisoning of the operator.**
2. **Ill effects on people in adjacent areas.**
3. **Damage to the cotton crop treated.**
4. **Injury to livestock.**
5. **Contamination of adjacent crops and pastures.**
6. **Injury to honey bees.**
7. **Destruction of insects that prey on pest species.**
8. **Adverse effect on birds and other wildlife.**
9. **Injury to fish and other aquatic life.**
10. **Damage to crops through accumulation in soil.**
11. **Impairment to flavor or odor of crops grown on treated crop lands.**
12. **Adverse effects on foods or other materials stored with insecticides.**

In considering the hazards of insecticides to man and animals, it is necessary to distinguish between the immediate danger (*acute* toxicity) and the accumulative effects (*chronic* toxicity). Skin irritation and sensitization are factors which must also be considered.

Although some of the insecticides which have been commonly used for years, such as nicotine sulfate, are very poisonous, the public has become so familiar with them that little thought is given to possible dangers attending their use. The toxicity of some of the newer insecticides, however, is not well understood and until this information is fully available and the public has become acquainted with possible hazards, governmental agencies advise keeping strictly on the conservative side.

In the use of insecticides there are a number of safety measures which must be considered if difficulties are to be avoided. These should be studied individually and in detail, as follows:

Effect on the Operator

FIRST to be considered is the operator, the man who is applying the insecticide. He must recognize and keep in mind the fact that while all insecticides are poisonous, the degree of toxicity covers a wide range. Some compounds are practically harmless in any form, whereas others are extremely hazardous to the user. These latter ones are not recommended by responsible agencies for use by the general public. However, materials such as parathion and hexaethyl tetraphosphate are being used rather extensively on an experimental basis, and much interest is being shown in parathion by cotton raisers because of its effectiveness in killing a number of insect pests.

These materials are so highly poisonous, whether inhaled, swallowed, or absorbed from skin contact, that they are not being recommended by the U. S. Department of Agriculture for general use by the public, and persons who handle them in any way must use special precautions.

It is not practical to present here in detail all the precautionary measures that should be taken when phosphorus compounds are used. Such information is available from basic manufacturers of these materials, and the Bureau of Entomology and Plant Quarantine is preparing safety statements to aid in protecting persons who may be using these highly poisonous compounds, experimentally or otherwise.

A few of the more important precautionary measures in handling phosphorus compounds are the avoidance of breathing vapors, sprays or dust, especially from insecticide concentrates. This can best be assured by using a gas mask of a canister design for protection against organic poisons.

Mixing and loading should always be done in the open air. Impervious gloves should be worn when it becomes necessary to handle the materials, and every effort should be made to avoid skin contact with them. As soon as possible after using phosphorus compounds or other materials known to be highly poisonous, exposed persons should bathe thoroughly and change clothes. In field operations, soap and water should be readily at hand, also a supply of atropine for emergency use. Quick action is essential should any symptoms develop. Contracted pupils, headache, and nausea are signals of trouble, and when they appear work with the toxic material should cease at once.

Persons in charge of field use of highly poisonous materials should be prepared to assume full responsibility for the enforcement of all recommended safety measures. (It should be pointed out that at least three deaths have resulted from more or less careless use of parathion in the field.)

Although DDT, toxaphene, chlordane, and benzene hexachloride, which are commonly used in cotton insect control, are much less poisonous than the phosphorus compounds, they should be handled as poisons. The concentrated solutions or emulsions should not have unnecessary, and certainly not prolonged, contact with the skin. Breathing of insecticidal sprays or dusts should be avoided as much as possible. It is advisable to use a good respirator in which the pads are changed frequently. The operator should wash his hands thoroughly before eating, and immediately upon completion of an application should change clothes and bathe.

It should be remembered that most solvents used in preparing insecticidal solutions are poisonous in some degree and some are also inflammable. The frequent contact of the hands with acetone, which is a common solvent of insecticides, may cause the skin to harden and crack.

Critics of the use of insecticides have reported a number of people killed from DDT. An investigation by the National Institute of Health of a considerable number of such reports showed all of them to be erroneous. That agency concluded that up to that date no authentic case of poisoning from DDT itself, when used as an insecticide, had occurred.

by

Dr. F. C. Bishopp

Assistant Chief, Bureau of Entomology and Plant Quarantine
United States Department of Agriculture

Effects on People Nearby

SO far as is known, there are no authentic cases of toxic effects on people living adjacent to treated cotton crops. In fact, some people have welcomed dusting or spraying of their houses and premises with DDT or related cotton insecticides for the purpose of destroying flies, roaches, bed bugs, etc.

As a general policy, however, the insecticide being applied to cotton should be held to the actual field being treated.

Damage to Cotton Crop

COTTON has shown marked tolerance to all the insecticides commonly used; furthermore slight burning of the foliage, especially of well developed plants, appears to be of no importance.

Oil solutions of insecticidal materials are likely to produce burning of the plants, particularly if the material is not well atomized. There is much difference in the burning effect of different oils, and they must be used with caution. Emulsions, especially if poorly prepared, used in concentrated form or not well distributed may cause severe foliage injury. Emulsifiable concentrates that will give stable emulsions in all sorts of water appear to be most desirable. Much research with emulsions is needed.

Injury to Livestock

THE immediate hazards to livestock are considerably greater from the careless use of calcium arsenate than the chlorinated hydrocarbons. This danger is due to the grazing of the stock on treated fields rather than from the direct contact of the poison with their bodies.

The ease with which cattle can be freed from flies by DDT sprays has led some cattle owners to encourage fliers to treat cattle that are near cotton fields being treated. The fact that DDT and most of the related materials may be excreted in the milk if dairy cattle are sprayed or dusted makes it necessary to avoid applying these insecticides to those animals. Any direct injury to livestock is unlikely, however, from their being accidentally hit by dusts or sprays of the commonly used cotton insecticides.

Contaminating Other Crops

THE danger of livestock being poisoned by calcium arsenate is considerable. Most growers are familiar with this danger and avoid dusting pastures where livestock are grazed. There is also a hazard from feeding hay cut on fields surrounding heavily treated cotton.

DDT and related materials applied to livestock or ingested by them may be excreted in milk or stored in the fat. It is important that such materials as DDT, chlordane, and benzene hexachloride be kept off pastures where dairy cattle are grazed. There is less tendency for toxaphene to be excreted in milk or stored in the fat than for the materials mentioned

above, and still less for methoxychlor.

Drift of calcium arsenate and the chlorinated hydrocarbon insecticides onto gardens should be prevented. These materials on leafy vegetables and small fruits are especially hazardous as considerable quantities may be held on the plants and they are difficult to wash off.

Sprays in general are less likely to drift than dusts. The larger the particles of either sprays or dusts, the less they drift, but particles that are too large are less effective as insect killers.

Aerial applications are more likely to contaminate adjacent fields, gardens, and pastures than ground applications. Therefore only competent and reliable pilots should be employed to do such work, fields should be flagged, and above all, the grower should be on hand to supervise the operation.

Distance of drift is largely dependent on atmospheric conditions including convection currents and winds. Height of flight is, of course, an important factor. From high-flying planes on a breezy day, dust or spray may be hard to control. Canopies or hoods on ground equipment help to hold the materials down on the crop.

Injury to Honey Bees

TREMENDOUS losses of honey bees have been experienced from dusting cotton and other crops with calcium arsenate. The material kills not only field bees, but it is carried into the hives and there destroys the queens and brood.

The newer insecticides have proved to be much less destructive to bees than calcium arsenate, especially if applied early in the morning. Toxaphene is less destructive than DDT, and benzene hexachloride and chlordane are considerably more so. Honey bees are so important as crop pollinators that every effort should be made to protect them. In order to protect bees, it is suggested that cotton growers make a practice of notifying bee keepers of dusting plans, so that they can move the hives. Beekeepers, on the other hand, should inform the cotton growers where their hives are located, and thus encourage cooperation.

Killing of Predators

EFFECTIVE pesticides are likely to kill beneficial, as well as destructive, insects. There is some selectivity, however, and advantage may be taken of this fact. The timing of insecticide applications may aid in protecting beneficial forms. For instance the early treatment of cotton on a community basis, as advocated by K. P. Ewing, appears to give opportunity for natural enemies of the bollworm to build up after the thrips and overwintering boll weevils have been destroyed. Numerous cases have occurred in which the destruction of predacious and parasitic insects has resulted in marked increase and damage from pest species such as the bollworm and aphids.

Effects on Birds

THERE appears to be little evidence that the use of insecticides on cotton has materially affected birds and other wildlife. Extensive studies by the Fish and Wildlife Service in cooperation with the Bureau of Entomology and Plant Quarantine have shown that heavy applications of DDT-oil sprays (5 pounds per acre) over large forest areas are very destructive to birds. This is probably the result of the birds eating large numbers of the heavily contaminated and dying insects.

Some effect of this kind may result where large areas of cotton are heavily treated, but in general the birds have ample range outside the cotton fields and apparently are little affected.

Injury to Fish

THE chlorinated hydrocarbon insecticides are very poisonous to fish, toads, lizards, and snakes. The arsenicals are less likely to produce injury. Extremely small amounts (0.005 p.p.m.) of toxaphene will kill certain species of fish. DDT, chlordane, and benzene hexachloride are less toxic to fish; yet they are sufficiently poisonous so that a single application at the rate of 5 pounds or even less per acre will kill a great many of the fish even in rapidly flowing streams.

It is therefore essential that great care be taken to avoid getting insecticidal dusts into fish ponds and streams. In employing spray equipment and in mixing sprays, it should be made certain that waste materials do not drain into streams or ponds.

Accumulation in Soil

IT is well known that heavy applications of calcium arsenate to light sandy soils may prove to be very detrimental to certain crops grown on them subsequently. Information on the possible ill effects of the newer insecticides on soils is not very complete. It has been demonstrated, however, that DDT and related materials, if added to soils in large quantities, may be strikingly deleterious to a number of crops. The cucurbits and rye appear to be very susceptible.

Light sandy soils with little humus are more affected than those containing much vegetable matter. Even as little as 25 pounds of DDT per acre mixed in light sandy soil may practically prohibit the growth of susceptible plants, while 500 pounds per acre may produce little effect on muck soils.

The importance of giving thought to the effect on soils of repeated heavy applications of stable insecticides year after year must be emphasized, and more research is needed to determine just what these hazards are. The use of sprays on cotton plants when young requires somewhat less insecticide than would the use of dusts.

One of the difficulties seems to be that some cotton raisers fail to make serious efforts to control the pests on their cotton, thus making it necessary for their neighbors to use inordinate amounts of insecticides to protect their crops. Other growers are so enthused about protecting every boll that they keep applying insecticides as long as there is one developing, regardless of the abundance of insects.

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Use of Phosphoric Acid as **Fertilizer**

THE idea of using phosphoric acid directly as a fertilizer was first conceived about 1934, at which time it was applied in irrigation water and drilled into furrows with a special attachment drill. A certain amount of success attended these first tests, and since considerable interest was being shown in methods of getting greater penetration of phosphorus into the soil, it seemed logical that a material such as phosphoric acid in perfect solution with irrigation water would penetrate the soil to the shallow roots of trees, at least. Subsequent tests verified this theory, and from the original experiments in California has grown the present extensive system of fertilization, not only of trees, but many other crops through the medium of irrigation water.

Phosphoric acid is viscous, non-volatile, and somewhat less corrosive than the other mineral acids. It can be shipped in iron tank cars, and is handled in iron drums for short periods in transit. Although the pure acid is water white, the material produced by the action of sulfuric acid on western rock phosphate, is tinted an emerald green by the presence of vanadium and chromium.

The Plan in Action

APPLICATION of liquid phosphoric acid in irrigation water is accomplished by a number of methods. In one practical operation, the operator first determines the area of land to be covered in the irrigation project, then he decides upon a rate of application. For instance, if it is to be applied at the rate of 200 pounds per acre, he calculates the total amount of acid necessary, then places the drum of acid over the stream, as shown in the accompanying photograph, so that the material may be added to the water. This takes place some distance above the place where the mixture is to be turned out on the land, so that a thoroughly-mixed solution will settle on the land. (Usually water is started on to the land, and a sample portion of the run is made to help the operator estimate the movement of water, and thus to judge approximately the time required to cover the land.)

Suppose that two barrels have been placed on the ditch bank to cover the specified land. Acid is allowed to run into the ditch in a small stream, from one of the barrels, regulated with a pinch cock. A measurement of the rate of delivery of acid per minute can be made and calculated to correspond with the rate of movement of irrigation water. However, an experienced operator may judge by observation the rate of delivery of acid and the rate of movement of water.

Since the last one-half of the field irrigates more slowly than the first half, more than half of the acid must be saved for the final half of the operation. Thus, when the land

Liquid fertilizer being introduced into the current of irrigation stream for adding nutrient to the soil in the area served by the water. Careful calculation is necessary to get the correct amount of phosphoric acid distributed.

is half covered, the operator should have part of the first barrel of phosphoric acid still remaining in order to have more than the capacity of the remaining barrel to apply for the final application. In other words, since more time will be consumed in covering the second half, more acid will be used.

A special device has been devised to allow the entrance of air to the top of the barrel as the acid flows out. The most simple outlet controlled by a pinch cock will answer the purpose and air may be admitted to the top of the barrel by loosening the plug on the top side of the barrel.

Coverage

THE first question asked is "How uniform is distribution"? Tests have shown that the acid is far more evenly distributed than would be expected. It is known that the upper end of the land gets more water, but the plan of allowing the water to run over the upper end before starting the acid, as outlined above, gives good coverage of acid.

Obviously, no water can be allowed to run off the field. Many practical irrigators say that it is impossible to hold all of the water, and in a few cases this is undoubtedly true. When it is necessary to spill water, the careful irrigator arranges to get all the liquid fertilizer on to the land by the time the water has reached the lower end. He then turns off for a short time allowing the water to settle and then turns on again. The second flow of water will remove very little phosphoric acid which fixes rapidly with the soil.

Penetration and Fixation

LIKE all soluble compounds of phosphorus, phosphoric acid acts rapidly with the bases in the soil. In irrigation water, there is very great dilution and thus, contact with the bases cannot be made until the water penetrates some little distance into the soil. In very sandy, porous soil, penetration will be greater than in fine, closely-packed clay soils, of course.

The depth of penetration has not been determined accurately for all types of soils because of the difficulty of making the accurate analyses which would be required. The facts are that good results have been attained with this method of fertilization.

It is known, at least, that phosphorus carried into the soil as phosphoric acid will have perfect dispersion.

It will be distributed evenly, molecule by molecule, in the soil until it is fixed by the bases. The following reactions illustrate the fixation process:

$$2\ H_3PO_4 + CaCO_3 \rightleftharpoons CaH_4(PO_4)_2 + CO_2 + H_2O$$
(Mono-calcium phosphate)

The further action of bases continues:

$$CaH_4(PO_4)_2 + CaCO_3 \rightleftharpoons 2\ CaHPO_4 + CO_2 + H_2O$$
(Di-calcium phosphate)

In very basic soils, the revision may still continue:

$$2\ CaHPO_4 + CaCO_3 \rightleftharpoons Ca_3(PO_4)_2 + CO_2 + H_2O$$
(Tri-calcium phosphate)

Even though we should have the formation of the very insoluble tri-calcium phosphate of the last reaction, the material is still well dispersed in the molecular state as it penetrates the soil in the perfect solution of phosphoric acid and water.

Under these conditions, it can be redissolved by carbon dioxide which is given off from the roots of plants. It will be noted that all three reactions are written as reversible reactions, that is, they can proceed either to the right or to the left.

In the event there is an abundance of CO_2 on the right produced by rapidly growing plants, the reactions will proceed to the left, towards the formation of soluble phosphates which are used by the crops.

Advantages

THE principal advantage of phosphoric acid as a fertilizer has just been described as its ability to penetrate the soil and be completely dispersed. Good dispersion provides the best feeding conditions for plants. When finely and thoroughly distributed through the soil, phosphorus can be assimilated quickly by the crop which is especially important in the case of the vegetable crops. It is necessary to have a means of feeding them quickly. Phosphoric acid provides that means.

The cost of application of fertilizer by irrigation water is less than the cost of applying solid fertilizer. Also, in the case of a heavy growth of certain row crops, solid fertilizers cannot be applied without damaging the crop. Fertilizer in irrigation water can feed such crops quickly and without mechanical injury. Another important advantage of phosphoric acid (H_3PO_4) is that the carrier of phosphorus is only the hydrogen ion. Under some conditions where it is necessary to avoid the use of fertilizers which increase the salt content, phosphoric acid is ideal.

Cost of Solid vs. Liquid

AT present, liquid phosphate is more expensive than the solid. The liquid is more concentrated, containing 55% P_2O_5 as against Treble Superphosphate at 43%. Even with a higher per cent P_2O_5 in the liquid, the cost of transportation is higher because of the high freight rate on liquids. Another factor involves distribution to the field which requires drums or special equipment which are subject to corrosion. This also tends to increase the cost.

But even at slightly greater expense, liquid phosphate has a positive advantage on rapidly growing intensive crops which require fertilization at specified periods in their growth, and where time is a factor. This method will always have an important place on trees and crops where penetration of phosphates must be attained, also. The general use of liquid fertilizers is only one example of the "revolution" that is taking place in agriculture to gain greater efficiency in production ★★

Use of Maleic Hydrazide as a Plant Growth Inhibitor

THE effect of maleic hydrazide on plants was first reported in 1949, by Schoene and Hoffman. Since then, reports have been published showing that the chemical controls Johnson grass, water grass, and barley without affecting cotton treated after the cotyledon stage (Currier & Crafts, 1950). It also temporarily inhibits growth of raspberries, strawberries (White and Kennard, 1950) and *Pyracantha* hedge (Knott, 1950). Miller and Erskine (1949) found that Gingko fruit could be eliminated by the use of maleic hydrazide. Naylor (1950) reported that maleic hydrazide prevented axillary bud development of tobacco and also produced male sterile corn with normal ear.

Results of greenhouse and field plot experiments conducted by the writer* are briefly summarized in this report. Maleic hydrazide formulated as a water soluble diethanolamine salt containing 30% active ingredient by weight was used. All dosages are expressed as active ingredient. A 0.03% concentration of "Antarox A200" was added to the sprays as a wetting agent and applications were made to runoff.

Greenhouse Experiments

TOMATOES were sprayed at a concentration of 0.25% and thoroughly washed at intervals in an artificial rain apparatus to determine how rapidly maleic hydrazide penetrated the plant. The plant response indicated that about one-third of the chemical entered the plant within 18 hours after the spray was applied.

Pinto beans in the two leaf stage were sprayed with four concentrations ranging from 0.03 to 0.25% and observed over a one month period after treatment. Terminal and axillary bud growth was inhibited at 0.06 to 0.25% concentration. Terminal growth was stopped and axillary buds forced at the 0.03% concentration.

Flats planted with Kentucky blue grass, chewing, alta and creeping fescues, Astoria bent, red top and perennial rye grass were treated at 2.0 lbs. per acre when the plants averaged 2 inches in height. One month later the rye grass was dead, whereas the other grasses equalled the untreated plants in height and vigor.

Young crab grass, *Digitaria sanguinalis*, sprayed at 0.25% stopped growing, the leaves gradually developed a red anthocyanin coloration and the plant died. Older crab grass treated at the same dosage was stunted but the leaves remained green. However, no seeds were produced and development of the root system was inhibited. This selectivity suggests that maleic hydrazide may be useful for weeding crab grass in lawns.

Johnson grass seeds, *Sorghum*

* The assistance of W. L. Hubbard and K. P. Hubbard is acknowledged.

Left to right, nut grass sprayed with 0.5% Maleic hydrazide; untreated nut grass; young Johnson grass sprayed with 0.25% Maleic hydrazide and untreated Johnson grass. Photographed eleven weeks after one spray application was made.

Older Johnson grass on right sprayed with one application of 0.25% Maleic hydrazide. The foliage remained green but no seeds or rhizomes developed. Untreated plants on the left. Photographed eleven weeks after spraying.

Maleic Hydrazide shows promise as inhibitor of certain weeds; tests also indicate that potato sprouts may be retarded or eliminated

halepense, were planted and the soil treated at a dosage of 10.0 lbs. per acre. The seeds germinated and the plants grew to a height of about one inch, developed a purple anthocyanin coloration and died. Johnson grass six inches high was sprayed at a concentration of 0.25%. Vegetative growth was inhibited and the plants gradually developed the typical anthocyanin color and died (Fig. 1). The grass similarly treated when about sixteen inches high grew very slowly, remained green but failed to produce seeds or to develop rhizomes (Fig. 2). Currier and Crafts likewise observed that young Johnson grass was more susceptible to maleic hydrazide.

Maleic hydrazide has a similar effect on witch grass, *Agropyron repens*. Young grass was killed at the 0.25% concentration. Older plants similarly treated remained green but failed to develop rhizomes (Fig. 3).

Nut grass, *Cyperus rotundus*, was not affected at the 0.25% level even when young plants were treated. At a 0.5% dosage vegetative growth was inhibited and the plant gradually became chlorotic and died (Fig. 1).

Field Plot Experiments

TWO replicated rows of John Baer tomatoes 25 ft. long were sprayed a month after planting when green fruit were present at dosages of 0.03 and 0.3%. Pickings made weekly showed that the higher concentration caused the fruit to mature earlier but total yield for the season was less than from untreated plots. Vine growth was inhibited, secondary growth was forced and flowers on the secondary growth were observed at the end of the season. The lower concentration had no apparent effect either on vine growth or on yield. The harvested fruit was normal in appearance.

Six dosage levels ranging from 0.0075 to 0.3% were applied to two replicated 25 foot rows of Green Mountain potatoes seven weeks after planting. A slight chlorosis developed on vines treated at 0.15 and 0.3%. No inhibition of vine growth was detected. Yields were not reduced by any of the treatments.

Tubers collected from the plot treated at 0.3% were kept at room temperature for five months and it was observed that no sprouts developed. Numerous sprouts were present on tubers from untreated plots. Foliage of other crops such as onions and carrots should be sprayed about two weeks before harvest to determine if maleic hydrazide might similarly inhibit sprouting in storage. It is also suggested that foliage of apples and other fruit be sprayed before harvest to determine if maleic hydrazide might prevent ripening of fruit in storage.

Yellow wax beans eight inches in height sprayed with 0.25% maleic hydrazide were severely stunted. The plants first turned a dark green color then developed a general chlorosis and wrinkled leaf surface within one month. No flowers developed on treated plants but flowers and pods were numerous on untreated plants. Beans sprayed at this concentration after pods were formed showed no visible effect from the treatment either in appearance of the foliage or in size of seeds and pods at the time of harvest.

Hybrid field corn six inches in height sprayed with 0.25% did not grow. The plants developed a red anthocyanin coloration and died in about one month. Young soybeans sprayed at this dosage were severely stunted through a six weeks period of observation. The plants remained alive and the foliage developed a deep green color.

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PHOTO BELOW

Witch grass sprayed with one application of 0.25% Maleic hydrazide. Vegetative growth was inhibited but leaves remained green. Rhizomes did not develop. Untreated plants on the right. Photographed eleven weeks after treatment.

NAC Association Panels Discuss Hearings, Liability, Publicity for

INSECTICIDES and FUNGICIDES

Spring business meeting held in Atlantic Cfty, April 20 and 21....Large registration hears Association reports; 4 industry panels

ERNEST HART

Industry in Healthy Condition

A COMPLETE resume of problems faced by the agricultural chemicals industry was discussed at the annual spring business meeting of the National Agricultural Chemicals Association at the Haddon Hall Hotel, Atlantic City, N. J., April 20 and 21. Matters involving the residue tolerance hearings, product liability, new legislation, public relations and association considerations were studied during the two day session.

In his opening address, NAC President Ernest Hart, president of the Niagara Chemical Division of Food Machinery Corp., Middleport, N. Y., told the group that there should be no acute shortage of insecticides during the using season, since there is ample plant capacity in the industry to handle any reasonable demands. However, he added, "Late buyers might suffer—next year, they will buy earlier." The president reported that the industry is in a healthy condition, with "most materials in good supply."

Mr. Hart then reviewed the Association's activities for the past year, pointing out some of the highlights of events both favorable and otherwise. There have been some instances of bad publicity, but offsetting this are larger amounts of accurate and factual literature which present the industry's story in a true light to the public, he said.

Mr. Hart reported that he has been greatly impressed by the interest and enthusiasm displayed by various groups before whom he has appeared as a speaker during the past year. He mentioned specifically his contact with a large group of custom aerial sprayers as well as with numerous other groups representing state and federal governments and their agencies. He reviewed the Food and Drug Administration Hearings to date, emphasizing the necessity for industry to make an impressive showing when its time comes to appear as witnesses. He urged the Association members to be sure that each individual product is entered in the record "not only to present the evidence required to establish the materials on the authorized list, but also that the briefs required later will be properly prepared and filed. If we don't have the proper follow-through, much of the effort made by government witnesses will have been wasted during the proceedings now concluded," he declared.

Lea S. Hitchner, executive Secretary of the Association told the group that with the development of new problems in the industry, it has been necessary for the Association to appoint additional committees to cope with them.

Panel on Hearings

CONTINUING along the line of the tolerance hearings, a four-man panel discussed in detail some of the ramifications of the proceedings. This panel, moderated by Howard W. Grady, California Spray Chemical Corp., Richmond, California, was composed of Dr. C. C. Alexander, Geigy Co., Inc., New York, John D. Conner, NACA special counsel, Washington, D. C., and Harris Green, Jr., Rohm & Haas Co., Philadelphia. Mr. Green substituted for F. J. Rarig, also of Rohm & Haas, who was unable to appear because of illness. Mr. Grady, in introducing the subject, stated that the FDA hearings are necessary to the development of the pesticide industry despite the fact that such a proceeding is costly from a financial standpoint. He called attention to the job done by the Association in assembling the data and passing on the information to member companies, remarking that if each firm were obliged to do this for itself, the cost would be "disastrous."

Mr. Conner, in a comprehensive look at the hearings, went into the history of insect control, pointing out how efforts had been made to keep bugs from destroying the food supply since many years B.C. . . . which he termed as "Before Chemicals." He described the old act of 1906, showing its inadequacy, and brought his hearers up to date by explaining the workings of the current hearings. He said that more than a thousand exhibits are already on the record and, some 4,700 pages of testimony have been turned in even before the industry representatives are put on the stand.

He said that information contained in the hearings record would be the basis for making future improvements in matters both legislative and technical as related to pesticides.

Dr. Alexander briefed his hearers on what type of testimony and cross examination wil be expected from industry witnesses. He said that questions may include data on residues, application procedures, and other considerations.

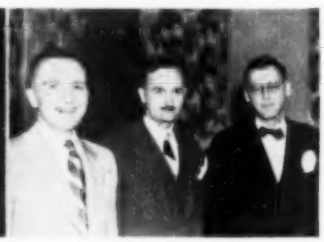
"The most important point brought out in the hearings is the extreme complexity of pest control on fruits and vegetables," he said. "There is no simple method. The same pest on a crop in different parts of the country requires different control measures—and one pest on a crop may require different control measures at different temperatures. In addition, new pests are constantly being encountered and old pests are developing resistance to some chemicals. Pest control is dynamic and there is a need for a stream of new insecticides and fungicides," he concluded.

Mr. Rarig's prepared paper, presented by Mr. Green, stated that a lack of information was the greatest liability of the industry as it started preparation for the tolerance hearings in January. Accordingly, representatives of the industry journeyed the length and breadth of the land to acquaint key persons with the nature of the proceeding and the type of data needed. The scientists were quick to get the significance of the hearings, and their cooperation assured the presentation of the full story in the shortest possible time and with an almost certain guarantee that there would be good cooperation. He lauded the "intelligent leadership" of the NAC Association in giving out information on the hearings, stating that as a result, the necessity for use of economic poisons has been firmly established. "When the record built on this issue of necessity is complemented by equally complete records on the remaining issues, the Administrator of the Federal Security Agency will be able to make findings of fact which will support realistic and workable regulations," he concluded.

The warning was also sounded that the industry must prepare its case as individuals. "It is clearly a fact, that unless each of us does his part in the subsequent phases of the hearing, we will lose much of the benefit . . . we will lose as an industry, and each of us will suffer individually."

Upon conclusion of the panel discussion, Frank S. Washburn, American Cyanamid Co., New York, presented his report as chairman of the Association Finance Commiteee. He pointed out the heavy expense under which the group has been operating due to the hearings, and presented a proposed budget for the coming year.

A group luncheon at the Haddon Hall on Thursday, heard a talk



PHOTOS

Top row, (L to R): Lea S. Hitchner, NAC executive secretary, Washington; Dr. F. P. Cullinan, Assistant Chief, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. D. A., Washington; Wallace Moreland, chairman, NAC Information Committee, New Brunswick, N. J.; C. Y. Haas, Attapulgus Clay Co., Philadelphia; Richard Hartley, Velsicol Corp., Chicago; and William Jarnigan, Attapulgus Clay Co.

Bottom row: Benjamin P. Steele, New York City; Jack Brunton, Kolker Chemical Works, Newark, N. J.; Jack Taylor, Taylor Chemical Co., Aberdeen, N. C.; G. E. Flemming, Montreal, P. Q.; and W. G. Geagley, Michigan State Chemist, Lansing, Mich.

on "General Business Trends" by W. M. Dennis, economist of American Cyanamid Co., New York. Mr. Dennis stated that the remainder of 1950 should see continuing prosperity for the agricultural chemical industry due to factors such as favorable farm income, which, although slightly below the peak of last year, is still sufficiently high to assure good business. "There has been no serious decline in farm prices," he said.

The speaker hit at the Government's policy of deficit spending, alluding to it as "habit-forming" like morphine. "It makes things look rosy now," he declared, but added that "it ends in physical and spiritual disintegration." He said that such a policy kills self-reliance on the part of the individual and leads the way to the welfare state. The only way to stop it is to quit much of the spending, he concluded.

Product Liability

FOUR legal experts formed a panel on product liability on Thursday afternoon, with Wilton M. Taylor, Niagara Chemical Div., Food Machinery Corp., moderator. Others on the panel included Richard Hansen, General Chemical Div., Allied Chemical & Dye Corp., New York; C. S. Maddock, Asst. General Counsel, Hercules Powder Co., Wilmington, Del.; and George P. Lamb, attorney, Washington, D. C., NAC Counsel.

The group presented the legal precedents for establishing who is responsible for accidents in the use of pesticides, either from the standpoint of personal injury or property damage. Manufacturers of economic poisons go to extreme ends to make their products both safe and effective, it was pointed out, but at the same time when misuse enters into the picture, difficulties may be encountered.

Proper labeling of products was mentioned as being of particularly great importance, with emphasis laid on warnings and precautionary statements as well as on full instructions for proper use. Also the necessity of anticipating the circumstances under which a product may be used, was pointed out.

Discussions following the panel's presentation brought up additional questions. One of these regarded the multiplicity of factors involved in applying a given pesticide. Weather temperature, condition of the soil, humidity, the time of year, and other considerations can affect the performance of a material, it was pointed out, but under certain combinations of these conditions the manufacturer is not likely to be held fully responsible for failure or damage during use if he has tested his product thoroughly before placing it on the market. The panel agreed that it is obviously impossible for anyone to anticipate every possible variation in conditions, and that a number of years may be required to find out all of the behavior characteristics of a product.

New Legislation

THE subject of new legislation was discussed thoroughly on Friday morning by a group of three experts headed by W. W. Sunderland, Dow Chemical Co., Midland, Mich., head of the NAC Legislative Committee. Other members of the panel included Joseph A. Noone, NAC Association staff member, and Dr. Charles L. Smith, Ethyl Corporation, New York.

(*Turn to Page 85*)

PHOTOS

Top Row (L to R): J. I. Shaefer, B. G. Pratt Co.; Wm. E. Merritt, Ashcraft-Wilkinson Co., Atlanta, Ga.; W. Mercer Rowe, Flag Sulphur & Chemical Co., Tampa, Fla.; Trenton Tunnell, Ashcraft-Wilkinson Co., Atlanta; George P. Lamb, Washington, D. C.; Joseph Noone, NAC Staff, Washington; C. S. Maddock, Hercules Powder Co., Wilmington, Del.; and Wm. Bowie, Hyattsville, Md.

Bottom row: Three representatives of Tobacco By-Products & Chemical Corp., Richmond, Va.: Henry Wood, James Merritt, and George F. Leonard, company executive vice-president and former NAC president; W. H. Prigmore, Eastern States Farmers' Exchange, Springfield, Mass.; J. H. Kennedy, Stauffer Chemical Co., New York; and Charles L. Hovey, Eastern States Farmers' Exchange, Springfield, Mass.

Lion Oil Company's New Plant Producing 570 tons per day of

ANHYDROUS AMMONIA

LION Oil Company's big new chemical plant at El Dorado, Arkansas, is now in full production making finished ammonium nitrate fertilizer starting from the simple ingredients of natural gas, air and water. Other nitrogenous materials produced, in addition to anhydrous ammonia and ammonium nitrate, include nitrogen solutions, sulfate of ammonia and aqua ammonia.

Daily output at the plant, on a 24-hour basis, exceeds the 570-ton-per-day designed capacity of anhydrous ammonia, the company says. This represents an increase of more than 30 percent over the former production, before the expansion program was completed late in 1949.

Above: Sulfuric Acid plant.

Below: General view of Lion Oil Co. installation at El Dorado.

Top row: Looking down at piping and equipment of the gas reform building where natural gas is reacted with steam to release hydrogen, necessary for the synthesis of ammonia.

Interior view of the ammonia synthesis building where eleven steam-driven engines maintain continuous circulation of the processed gas through the convertors where, the final step to process by catalytic action, processed gas is converted into anhydrous ammonia. (NH_3)

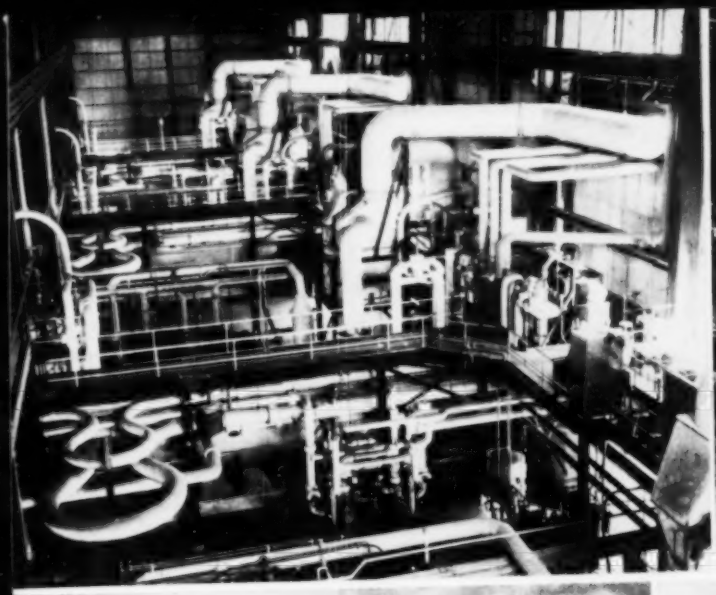
Middle Row: At the nitric acid plant, of which these absorption towers are an integral part, anhydrous ammonia is oxidized to form nitric acid used in the manufacture of ammonium nitrate.

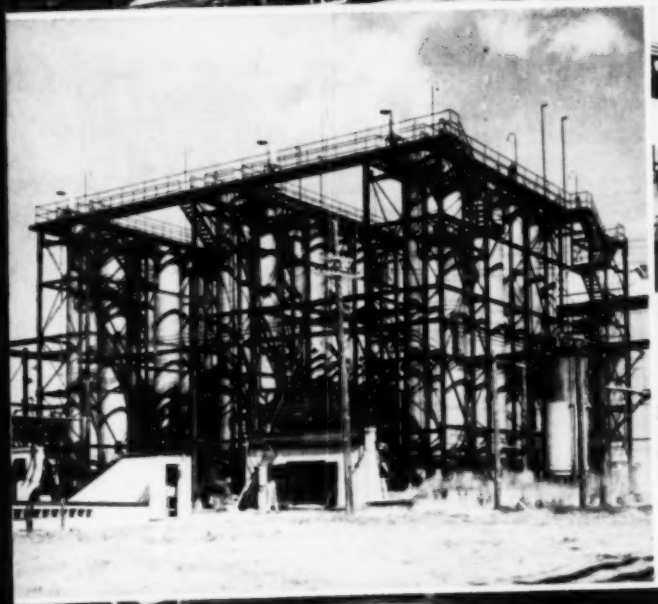
Photos on page 41

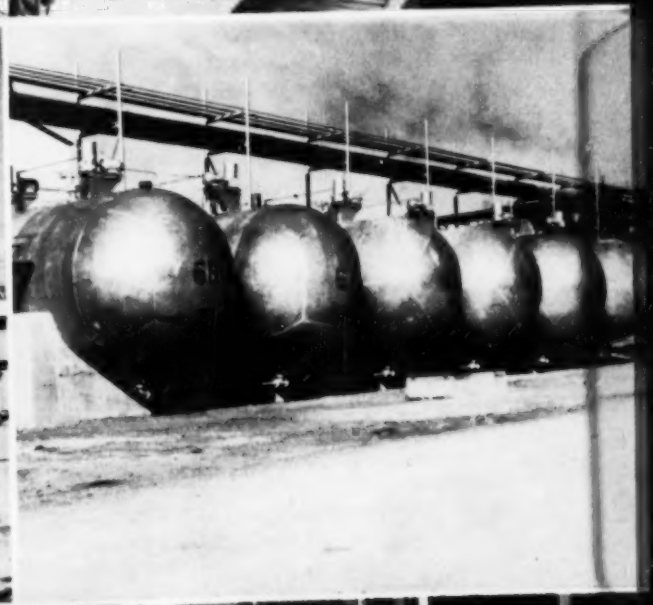
This product is later pelleted to form the actual soil fertilizer.

A battery of aluminum storage tanks in use at the plant. These tanks, said to be the largest pressure vessels ever fabricated out of aluminum, are used for storage under pressure, of petrochemical products (nitrogen fertilizer solutions) which are corrosive to conventional tank metals . . .

Bottom Row: Automatic bagging machine in pelleting plant capable of loading 16-100 lb. bags of ammonium nitrate fertilizer per min. Filled bags are then taken by roller belt from this machine into railway freight cars for shipment.








LION
AMMONIUM NITRATE

Author gives present status of insecticides for use in

Pea Aphid Control

IN certain areas of the northwest and along the Atlantic seaboard, high pea aphid populations during the growing season are to be expected annually, while in the central and midwest, serious infestations are reported to occur only occasionally. In some sections, the aphid is primarily a serious problem only on sweet or wrinkled peas, whereas in other localities it occurs in numbers only at a time when the smooth seeded or Alaska type is maturing. In Maryland, where the author has worked on this problem, all varieties of canning peas are attacked and unless control is attained, severe injury occurs annually in most localities and particularly on the light soils of the Eastern Shore.

Plantings by individual canners in Maryland seldom exceed 1000 acres and they favor treatment by ground equipment. In the midwest and far west where individual outfits plant much larger acreages, treatment by air equipment is favored. This is not because air application of insecticides is as good as or better than ground treatment, but because of the labor required and the amount of ground equipment that must be maintained for use over a very short period of time. Whether a canner uses the airplane or the ground duster or sprayer, the problem of what to use and when to treat remains very much the same.

During the past fifty years there has been much improvement in the insecticides suitable for pea aphid control. From 1900 to 1935 nicotine, in either sprays or dusts, was the only insecticide available that would, under favorable conditions, effect a high degree of pea aphid control. In 1936 Dudley *et al* found that a spray of ground derris root with a wetting agent was very effective against the pea aphid. From 1936 until the end of the last war, rotenone dusts and sprays were used and generally preferred to nicotine insecticides. Since the war DDT, and, more recently, parathion dusts and sprays have been found to be superior to rotenone preparations for pea aphid control.

Effective DDT Preparation

ALL preparations of DDT may be placed in two classes; first, those in which *a solvent is present*, as in emulsions, oil solutions, and impregnated dusts; and second, those in which *no solvent is used*. This latter class includes dry mixed dusts and wettable powders. For pea aphid control, preparations of class one are far more efficient than class two.

Experiments carried on by the Maryland Station and observations on commercial treatments in Maryland showed that whereas dry mixed dusts containing 5% DDT at 40 pounds per acre gave about 50 per cent control of the pea aphid, dusts containing 1 per cent DDT impregnated with 2 per cent non-volatile solvent applied at 50 pounds per acre under favorable conditions gave 90 to 99 per

TABLE I

Results of DDT emulsions, DDT wettable powders, and ground derris root sprays on pea aphid control. DDT applied at one-half pound per acre. Treatments applied May 8.

Treatment	Average No. of aphids per sweep		Per Cent Control	Yield pounds shelled peas per acre
	May 8	May 19		
DDT emulsion in P.D. 544-A[1]	32.4	15.3	96.2	3580
DDT emulsion in P.D. 544-B[1]	25.5	12.4	96.9	3553
DDT wettable powder finely ground	34.5	131.9	67.5	2950
DDT wettable powder coarsely ground	37.5	208.9	48.5	2789
Ground derris root (6.3% rotenone) 3 lb. per acre	45.1	189.0	53.4	3238
Untreated checks	29.2	406.0	—	2618

[1] P.D. 544-A and P.D. 544-B (treated) here referred to are methylated naphthalenes and products of the Socony-Vacuum Oil Company in New York.

[1] Miscellaneous Publication No. 79, Contribution No. 2148 of the Maryland Agricultural Experiment Station (Department of Entomology).

by

L. P. Ditman

Maryland Agricultural Experiment Station

cent control. The results secured with wettable powders are comparable to those of dry mixed dusts, while DDT emulsions which contain a solvent give results as good as or better than impregnated dust. Results of an experiment conducted at Ridgley, Maryland, in 1949 to determine the relative efficiency of DDT emulsions and wettable powders and ground derris root are given in Table I.

When equal amounts of DDT were applied per acre the performance of emulsions was much better than wettable powder sprays. The percentage of control by sprays of wettable powder may be increased somewhat by applying greater amounts of DDT, but even with 2.5 pounds per 100 gallons results were not comparable to one-half pound in emulsion form.

For pea aphid control the Maryland Station recommends the application of one-half pound of actual DDT per acre either in an emulsion spray or in a 1 per cent dust impregnated with 2 per cent nonvolatile solvent such as *Velsicol* AR-60 or in liquified gas aerosols.[1] The application of any form of DDT renders pea silage unfit for animal food.

Parathion Dusts, Sprays

LIMITED observations indicate that parathion is a highly effective pea aphicide, either in dusts or sprays and by both ground and aerial application. It is, however, exceedingly dangerous to apply, for which reason many states, including Maryland, do not recommend its use. Residues of parathion are not so persistent as those of DDT; they will disappear from the plants in about four weeks and will not render pea silage unfit for feed. Parathion must be applied early so that residues deteriorate before harvest. Late treatment near harvest time may provide a harvesting hazard to personnel.

The advantages of and objections to the newer insecticides for pea aphid have made it impossible for the entomologist to make recommendations without reservations. He can only inform the canner or grower and the canner or grower will have to choose the method that best suits his particular situation.

Timing Treatments

TIMING is one of the most controversial problems concerned with pea aphid control, largely because of the desire to set a definite standard; i.e., number of aphids per sweep at which point treatments should be applied. Canners with little experience and perhaps inadequate equipment usually wait too long before control measures are taken. Experienced canners check the development of the aphid closely and if a severe infestation is in prospect, they begin treatments a little early at 10 to 20 aphids per sweep. By the time they have nearly finished operations the last acreage will probably be a little past the optimum time for treatment, but most of the peas will have been treated at the proper time. Experienced canners wisely prefer to be early rather than late.

The author has always considered the development of the pea plant in applying aphid treatments. The rule is to wait as long as possible until peas begin to bloom so as to give maximum protection to the plants during the blooming and podding period. This insures a crop and if the aphid infestation rebuilds, it is usually after the crop is made and the loss is not great. There are times when the aphid infestation reaches injurious proportions before blooming so that treatments must be applied some time before bloom and in extreme instances two applications are necessary to insure a crop. One application of DDT provides a longer period of protection than does one application of derris root. The better grades of rotenone sprays and dust usually hold an aphid infestation 6 to 7 days; that is, 6 days after treatment the population will have recovered to the same level as at treatment time. An efficient application of DDT not only gives a greater initial reduction of an aphid population but also provides a 14 to 16 days period before the population returns to the pretreatment level.

Since the war there has been an effort on the part of canners to improve pea quality. This can be done by making two applications of DDT, the first to protect the plants during the podding period and the second to keep the vines green and succulent till harvest. When the plants remain in good growing condition the maturing period is lengthened so that peas remain in a state of high quality longer.

(*Turn to Page 95*)

[1] Ditman, L. P.; Floyd F. Smith and George Burkhardt. Liquefied Gas Aerosols for Pea Aphid Control; Third Report. Jour. Econ. Ent. Vol. 40 pp. 190-194, 1947.

Who grows PEACHES like these?

Georgia Growers, of course! They may boast a little but no wonder. They fertilize with . . .

Sul-Po-Mag
Water-Soluble
Double Sulfate of Potash-Magnesia

Big, beautiful, juicy, flavorful peaches are a tradition in Georgia. Growers there and in other states, too, are getting large yields and fine quality because they use fertilizers containing *Sul-Po-Mag*.

Thousands of farmers throughout the country find that they get earlier maturity, healthier growth, larger acre yields and more profitable production on magnesia-deficient soils by using *Sul-Po-Mag* for fruit, vegetables, cotton, tobacco, grain and other crops.

Sul-Po-Mag supplies potash and magnesia in a properly-balanced combination; both the potash and magnesia are in water-soluble form and are quickly available to crops. You can provide the farmer with magnesia in the most practical and economical form by including *Sul-Po-Mag* in your quality fertilizers.

Sul-Po-Mag is mined and refined exclusively by International at Carlsbad, New Mexico, to help you serve your farm customers better in meeting their problem of growing better crops on magnesia-deficient soils.

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NFA to Observe 100th Anniversary of American Fertilizer Industry

Large attendance expected at Association's summer meeting at the Greenbrier. Speakers include Coleman, King, Sanders, Robey and Sauchelli. Full schedule for 4-day meeting

THE National Fertilizer Association has announced most of the details of its annual summer convention to be held at the Greenbrier Hotel, White Sulphur Springs, W. Va., June 12-15. Speakers scheduled to appear will represent agriculture, business, government agencies and the agricultural press. The general theme of the meeting will be built around the Industry's 1950 Centennial observance which is expected to reach its climax at the June convention.

Among speakers to appear are Dr. Paul D. Sanders, editor, *The Southern Planter*, Richmond, Va.; Dr. Robert M. Salter, chief, Bureau of Plant Industry, Soils, and Agricultural Research Administration, U.S. D.A., Washington; and Ralph Robey, chief economist, National Association of Manufacturers, New York.

The NFA Plant Food Research Committee will present a panel on "A Century of Progress in Compounding and Utilizing Fertilizers," with the following men participating in the discussion: Dr. H. B. Siems, Director of Research, Plant Food Division, Swift & Co., Chicago; S. D. Gray, northeast manager, American Potash Institute; H. H. Tucker, president, Coke Oven Ammonia Research Bureau, Columbus, Ohio; Dr. K. D. Jacob, head, Division of Fertilizer and Agricultural Lime, B.P.I.S.A.E., U.S. D.A.; and Vincent Sauchelli, director of Agricultural Research, Davison Chemical Corp., Baltimore, Md.

Ray L. King, Georgia Fertilizer Co., Valdosta, Ga., chairman of the NFA Board of Directors, will deliver his annual address, as will Dr. Russell Coleman, Association President.

The annual banquet is scheduled to be held on the evening of June 13, with an unannounced program which the Association states is being held as a "surprise." On Monday, June 12, the Board of Directors, the Plant Food Research Committee and other committees of the Association are scheduled to meet. A program for visiting ladies has been arranged by the convention committee, with the cutting of a large centennial cake an event of particular interest, it is announced.

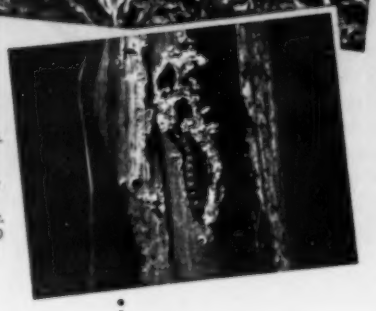
DR. RUSSELL COLEMAN
Makes Presidential Address

DR. P. D. SANDERS
Editor Appears on Program

DR. RALPH ROBEY
Discusses Economic Situation

CROP RAVAGED BY EUROPEAN CORN BORER. These destructive insects—especially the first brood—are hard to get at. They hide in tunnels and hug the stalks (see small photo). *(U.S.D.A. Photos)*

Sell Penco® DDT now to stop this $350 million menace



HOW TO PREVENT DAMAGE. Clean plowing is important, delayed planting helps. But, cheapest, sure method is to protect crops with Penco DDT dust or spray. *(Ill. Natural Hist. Survey Photo)*

IN 1949 the European Corn Borer destroyed an estimated 313,819,000 bushels of field corn, in addition to causing huge sweet corn losses! THIS YEAR the damage may increase, unless growers take action *now!*

Penco DDT Emulsion Concentrate 34 is one of the best weapons known for control of the European Corn Borer. This powerful insecticide has already proved extremely effective in actual field use.

EASY TO USE! Penco DDT Emulsion Concentrate 34 can be sprayed from planes, or from ground equipment . . . in concentrated or dilute emulsions.

SAVES ON COSTS! Made by a *basic* DDT producer, it offers guaranteed high quality at low cost to *you*.

LESS DANGER TO PLANTS! With Penco DDT Emulsion Concentrate, there's no plant injury when used as directed. That's because the superior solvents used in its manufacture evaporate quickly after field application, leaving the crop covered with DDT.

Send for this free bulletin. For mixers, compounders, growers. Contains the latest information on the borer: how it develops, how it destroys corn, how to control it. Get your *free* copy of "European Corn Borer Control." Write to: *Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa.; (Tacoma, Washington; Bryan, Texas; Portland, Oregon; Los Angeles, Calif.)*

✓ CHECK THESE EXTRA PENCO ADVANTAGES—

✓ HIGHER CONCENTRATION OF DDT! LESS FREIGHT! LESS HANDLING! USE LESS PRODUCT PER ACRE!...with PENCO® DDT EMULSION CONCENTRATE in 34% concentration (3 lb. DDT per gal.).

✓ For Dust Mixers: Investigate Pentech A & H—New, friable 100% technical DDT—an exclusive Pennsalt development.

PENN SALT

agricultural chemicals

Progressive Chemistry for a Century

Petroleum Weed Killers

by

John M. Bell[1] **and**
W. Luther Norem[2]

PART II

This part of the article on Petroleum Weed Killers concludes the paper which was introduced in the April issue. The tables mentioned herein, appeared with the earlier issue.—Editor

Applications

General Contact Weed Killers—As mentioned earlier, smudge pot oil and Diesel fuel have been used for many years (chiefly in oil-producing areas) as weed killers along railroad rights-of-way, ditches, highways and around industrial buildings and airport runways. These oils "creep" when applied to a plant and cover it thoroughly, penetrating to the growing points of grasses. They are comparatively cheap and readily available.

Longtime users of Diesel fuel as weed killers have complained that recent production is not as toxic as that of several years ago. Present automotive requirements for a relatively smokeless fuel of improved performance have resulted in the production of fuels, which, in order to meet current high-speed Diesel engine fuel requirements, contain a higher percentage of relatively non-toxic straight-chain paraffinic hydrocarbons, which are of little value as weed killers. A comparison between typical Diesel fuels produced in 1935 and current production is shown in Table III. Note that the present product contains much less of the higher boiling materials which contribute to the chronic toxicity of the oil.

There has been a growing concern over the practice of employing fuel oils for weed killing. To aid in fuel conservation, several major oil companies have introduced "aromatic-type" weed killers—oils which are specifically produced for this particular task and possess two to three times the toxicity of the products formerly used. These new oils control many weeds hitherto considered oil-resistant and, because of their enhanced toxicity, can be applied in lower volumes. This toxicity results from the aromatic hydrocarbons which they contain. By reason of their own high inherent toxicity, these oils do not require supplemental fortifying agents. They are contact killers and do not translocate to the roots. Since a sufficient quantity must be applied to cover the weeds thoroughly, it follows that the most economical treatment is made when the weeds are tender and small (2 to 4 inches high). Most annual weeds are killed by a single treatment.

Repeated sprayings are required to control established persistent perennials such as Johnson and Bermuda Grasses, and poison oak. The first treatment, early in the growing season, will kill the top growth. Respraying is done as soon as regrowth appears, usually in three to five weeks. Eventually the carbohydrate root reserves will be exhausted, and the plant will die. About four treatments are needed to eradicate an infestation of a perennial.

These oils are not suitable carriers for 2,4-D because they kill the top growth of the weeds before the growth-regulating substance can be translocated to the root system. They are, however, excellent DDT carriers, and are used to destroy the host plants while treating swamps and ponds for mosquito control.

Application is made preferably through fan-type nozzles at pressures of about 50 pounds per square inch. These low pressures reduce fog and drift, and result in a controllable spray pattern.

Selective Weed Killer

CARROTS and related crops have considerable tolerance for certain refined oils. Growers have taken advantage of this fact by spraying their weed-infested plots with stove oil. Such applications, properly timed, have resulted in satisfactory weed control. This practice was accompanied by an inevitable stunting of the carrot plants. Occasionally, if the oil was applied too near to harvest time, the carrots retained an objectionable oil flavor.

The use of an oil not specifically designed as a selective weed killer involves risk. The various brands of stove oils available, produced from different crude stocks and refined to varying degrees, cover a wide range of phytotoxicity. Some are so highly refined that they lose their toxicity; while other heavier products, almost in the Diesel fuel range, lose their selectivity. Crafts and Reiber (1) reported on two stove oils used in California's Salinas River Valley. One, quite toxic to both carrots and weeds, had a gravity of 34.7° API. The other oil, whose performance was satisfactory, had a higher API gravity.

In recent years, refined selec-

1 California Research Corporation, San Francisco, California.
2 California Research Corporation, La Habra, California.
3 Petroleum Weed Killers furnished by California Spray-Chemical Corp., Richmond, Calif.

tive weed killers have become available. These do not stunt the crop plants and can be applied up to six weeks before harvest with no danger of flavoring the carrots. These products have gravities in the neighborhood of 42° API. Celery, both in seed beds and after transplanting, can be selectively weeded by these new oils. Celery growers report that these weed killers are also effective insecticides against aphis and thrips. Substantial volumes are used in weeding cranberry bogs, and they show promise in weeding flax.

Selective sprays are applied in the same manner as the general weed killers. Special precautions, however, must be observed for transplanted celery. Low pressures and coarse sprays are undesirable because large droplets of oil on the inner side of the leaf petiole may coalesce and run down into the heart, causing a rot. Pressures at the nozzle should not be below 50 pounds per square inch and 75 pounds is preferable.

Pre-emergence Spraying

THE practice of pre-emergence spraying consists of spraying certain row crops to kill the weeds present before the emergence of the crops such as carrots, onions, celery, spinach and sugar beets. The crop seedlings then can develop in weed-free soil without the competition offered by young weeds for moisture and nourishment. This results in a more vigorous and better stand of plants and the number of later cultivations is reduced, thereby minimizing the germination of weed seeds brought to the surface. Pre-emergence spraying is most advantageously carried out with slowly germinating crops. An interesting modification is being tested in some sections of California and Colorado. The seed bed is prepared several weeks before planting, thus permitting the weeds (many of which germinate more slowly than the beets) to start. The seed is then drilled into the weedy soil with as little disturbance as possible. The weeds are destroyed by a simultaneous application of weed killer.

As pre-emergence spraying is performed when the weeds are quite small, material costs are low. Twenty to thirty gallons per acre is the usual amount required, and application costs are far below the cost of hand weeding. These low volumes permit airplane application, a method frequently employed when the soil is too wet to permit the operation of ground rigs.

Emulsions

IN some sections of California, emulsification of herbicidal oils with water is practiced. The object is to spread the oil more thinly and thus achieve the same kill at less cost. Although the cost-per-gallon of the finished spray is low, extensive tests have shown that the cost per acre or per weed is greater when emulsions are used. In an emulsion spray, the oil globules are dispersed inside larger water droplets. When the spray comes in contact with the weed surface it is repelled, collects into drops and runs off. Because of this run-off and oil loss which accompanies emulsion spraying, poor kills result. Grasses, in particular, recover quickly and completely from an initial injury and resprayings must follow at shorter intervals. An agitator must be added to the spraying equipment, and the addition of emulsifying agents is usually necessary. As higher pressures and volumes are needed to increase the penetration and coverage of an emulsion, time is lost in the extra trips to refill the spray tank. Field tests show a better result from a given small volume of oil applied at a low pressure through suitable small-orifice nozzles than from the same amount of oil applied with three times its volume of water in an emulsion. With the unemulsified straight oil the original kill is more complete and the amount required to maintain control in succeeding treatments is substantially lower.

Until wetting agents are developed which will give an emulsion the same affinity for a waxy plant surface as that possessed by oils, thus permitting uniform coverage and thorough penetration into the protoplasm, straight oils will be consistently superior.

With substantially equal volumes of water and oil, it is possible to prepare two types of emulsion: the oil-in-water type previously discussed, and one in which water is dispersed in a continuous external oil phase. Greenhouse tests have demonstrated no superiority of the water-in-oil type, 1:1 emulsions of both types being equally toxic.

Better results have been obtained with fortified emulsions. Oil soluble compounds, including nitrophenols and chlorophenols, are used to increase the toxicity of emulsions. By varying the oil-water ratio and the concentration of the fortifier, the strength of the herbicide can be adjusted to control weeds of different degrees of maturity and resistance through the season.

The use of water soluble fortifiers for pre-emergence spraying is risky. If a rain follows shortly after the crop plants have emerged, the toxicant may be re-activated and kill the tender, young seedlings. However oil soluble toxicants are not affected by rain.

Fortified emulsions are most effective in the tropics. Their action in temperate climates is slower and in cold foggy weather may be quite disappointing.

Aquatic Weed Killers

AS A result of extensive field tests by the Bureau of Reclamation in the Western states, the U. S. Department of the Interior has applied for a patent on a weed killer to be used to kill submerged aquatic weeds and mosses in drainage and irrigation ditches (6). This new product is a volatile liquid composed either of coal-tar distillates or petroleum-derived aromatic solvents. It is applied with an emulsifier through a high-pressure nozzle below the surface of the water in the ditch at a concentration of 200 to 1,000 parts per million. At the higher concentration it is toxic to mature weed growth. These materials are also reported to be effective against snails, crayfish, and mosquito larvae. (Fish and frogs are also killed by the product.)

(Turn to Page 96)

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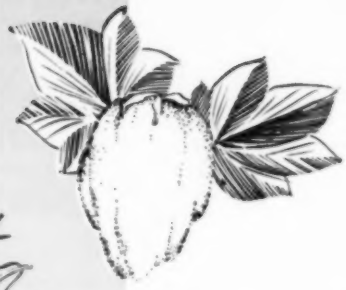

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5th Annual Meeting of American Plant Food Council

Leaders in research, agriculture and government among speakers on program at Hot Springs, Va., June 29th-July 2nd

A VARIED program has been planned for the fifth annual convention of the American Plant Food Council to be held at the Homestead Hotel, Hot Springs, Va., June 29 to July 2, according to Clifton A. Woodrum, APFC president. The Council expects some 400 members and guests to be present to hear the sessions featured by leaders in agriculture, Government and research.

Dr. Douglas S. Freeman, Richmond, Va., author, historian and Pulitzer Prize winner will be the principal speaker at the banquet session on Saturday evening, which is expected to be one of the highlights of the convention. Dr. Freeman, an outstanding orator, holds honorary degrees from more than 20 colleges and universities, and has served as a trustee of the Rockefeller Foundation, on the General Education Board of the Carnegie Endowment for International Peace and on the Woodrow Wilson Foundation. His Pulitzer Prize-winning work consisted of four volumes on Robert E. Lee, written in 1934.

President Woodrum will open the convention proper on June 30, with his annual address. He will be followed by U. S. Senator Spessard L. Holland, Florida, member of the Senate Committee on Agriculture Forestry.

W. R. Thompson, Associate Leader, Extension Agronomy, Mississippi State College, will address the convention on "Plant Food and Pastures," following Sen. Holland. Well known throughout the south as "the pasture man," Mr. Thompson has attracted widespread attention as a lecturer and leader, with a down-to-earth approach to the problem of grassland farming in a sound agricultural program.

The session of Friday, June 30, will be devoted to the appointment of convention committees, a brief business session, and the election of nine members to the American Plant Food Council Board of Directors.

Awards to the six national winners in the 1950 essay contest on "Soil Fertility and the Nation's Future" will be made on July 1. The prizes will be awarded by Assistant Secretary of Agriculture, Knox T. Hutchinson, chairman of the National Board of Judges.

Other members of the Board of Judges are Dr. Hugh H. Bennett,

DR. DOUGLAS S. FREEMAN
Main Speaker at Banquet

SEN. SPESSARD L. HOLLAND
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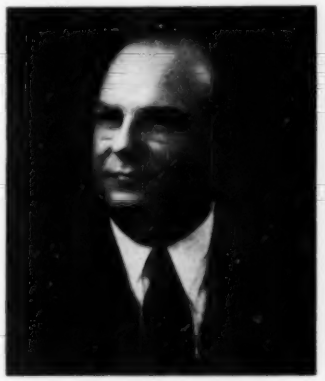

JOSEPH A. HOWELL

Heads Convention Committee

Chief, Soil Conservation Service, U. S. Department of Agriculture; Miss Lois M. Clark, Assistant Director, Division of Rural Service, National Education Association; Dr. W. T. Spanton, Chief, Agricultural Education Service, U. S. Office of Education and Dr. M. L. Wilson, Director of Extension Work, USDA.

Sponsored by the National Grange and American Plant Food Council, the 1950 contest attracted more than 20,000 essays from young men and women in the 48 States and District of Columbia. Albert S. Goss, Master of the National Grange is scheduled to speak in connection with the awards which total $10,000.

National prizes in the contest are: First, $1,000; Second, $500; Third, $400; Fourth, Fifth and Sixth each $300.

The National winner to be selected in June, will read his or her paper as a feature of the presentation ceremonies.

The following committees have been appointed in connection with the fifth annual convention: *Convention committee*: J. A. Howell, President, Virginia-Carolina Chemical Corporation, Richmond, Chairman; A. F. Reed, Vice President Lion Oil Company, El Dorado, Arkansas; R. C. Simms, President, Naco Fertilizer Company, New York City; Paul Speer, Vice President, U. S. Potash Company, New York City, Fred J. Woods, President, Gulf Fertilizer Company, Tampa, Florida and W. T. Wright, Vice President, F. S. Royster Guano Company, Norfolk Virginia.

Credentials—W. L. Waring, Jr., President, Lyons Fertilizer Company, Tampa, Fla., Chairman; J. C. Crissey, Division Manager, G. L. F. Soil Building Service, Ithaca, N. Y. and Howard Fisher, Gen. Mgr., The Michigan Fertilizer Company, Lansing, Michigan.

Golf—Albert B. Baker, Jr., Bradley & Baker, New York City, Chairman; C. F. Burroughs, Jr., F. S. Royster Guano Company, Norfolk, Va.; Dean R. Gidney, U. S. Potash Company, New York City; J. W. Ground, III, Thurston Chemical Co., Joplin, Missouri and W. F. McLane, Lyons Fertilizer Co., Tampa, Fla.

Hospitality—G. Tracy Cunningham, Asst. Gen. Sales Mgr., Armour Fertilizer Works, Atlanta, Georgia, Chairman; Paul Ausley, Potash Company of America, New York City; L. R. Boynton, Mgr., U. S. Potash Co., Atlanta, Ga.; Roy F. Camp, Vice President, Chilean Nitrate Sales Corp., New York City; Wm. B. Copeland, Vice President, Smith-Douglass Company, Inc., Streator, Illinois; F. B. Stephenson, Vice President, Robertson Chemical Corp., Norfolk, Virginia; J. D. Stewart, Jr., Executive Vice President, Federal Chemical Co., Louisville, Kentucky and G. A. Woods, Potash Company of America, Raleigh, North Carolina.

Ladies — Mrs. A. B. Baker, Sr. of New York City, Chairman; Mrs. Horace M. Albright of New York City; Mrs. L. Dudley George of Richmond, Virginia; Mrs. John E. Sanford of Atlanta, Georgia; Mrs. J. D. Stewart, Jr. of Louisville, Kentucky; Mrs. Margaret Caldwell, Greensboro, North Carolina; and Miss Martha Anne Woodrum of Roanoke, Virginia.

Memorial—L. Dudley George, Sec.-Treas., Richmond Guano Co., Richmond, Va., Chairman; George T. Ashford, Manager, Liberty Manufacturing Co., Red Springs, N. C. and J. S. Culpepper, Asst. Gen. Sales Mgr., Spencer Chemical Co., Kansas City, Missouri.

Awards to be presented to winners of APFC-National Grange essay contest...complete program covers many phases of fertilizer field

American Chemical Society's Philadelphia Meeting Covers

FUNGICIDES

NEWER developments in fungicides were discussed at the National Meeting of the American Chemical Society at Philadelphia April 12. Dr. J. L. St. John, Washington State College, Pullman, Wash., was chairman of the session which included the presentation of seven papers during the course of Wednesday afternoon.

Dr. R. H. Wellman, Carbide & Carbon Chemicals Division of Union Carbide & Carbon Chemical Corp., New York, introduced the topic by pointing out the tremendous losses sustained each year in the U. S. through plant disease. He said that such losses amounted to about two billion dollars annually, but this figure would be a billion dollars larger if one were to include the decay of wood, spoilage of food and industrial goods caused by fungi. He emphasized that without the application of fungicides, this total loss would be much greater.

Testing techniques for fungicides were described by Dr. S. E. A. McCallan, Boyce Thompson Institute for Plant Research, Yonkers, N. Y. He reported that during the past decade there has been rapid advancement in the development and use of techniques to screen chemicals as possible fungicides. Methods are of two general types, he said. The first type involves work with the fungus and chemical; the second involves the fungus, chemical, and host. The former is more simple, but is relatively nonspecific; the latter, more involved, gives results which are more specific and more directly applicable to practice. Statistical interpretation has emphasized the dosage-response curve, errors of technique, experimental designs and necessary significant difference, he said.

"Improvements should stress precision and especially better correlation with field results and development of appropriate methods for new applications," it was concluded.

A paper prepared by W. H. Tisdale and A. L. Flenner, E. I. duPont de Nemours & Co., Inc., Wilmington, Del., reported on the derivatives of dithiocarbamic acid as fungicides. They described the uses of the dimethyl and ethylene-bis derivatives in particular. Tetramethylthiuram disulfide (thiram) is used as a seed disinfectant and turf fungicide. Ferric dimethyl dithiocarbamate (ferbam) is outstanding for control of fruit and flower diseases and tobacco blue mold. Zinc dimethyl dithiocarbamate (ziram) is used for control of vegetable crop diseases while zinc ethylene bisdithiocarbamate (zineb) is used either as a dry powder or tank-mixed product. The latter is obtained by treating sodium ethylene bisdithiocarbamate (nabam) with zinc sulfate. Zineb is "especially attractive" for control of late blight of potatoes and tomatoes.

Manganese ethylene bisdithiocarbamate appears to have promise as a curative fungicide, the paper stated. It was pointed out that these products are specific in action and on the whole are safe to plants. They have also proved harmless to humans, with the exception of occasional skin irritations.

Dr. James G. Horsfall, Director of the Connecticut Agricultural Experiment Station, New Haven, Conn., discussed the fungitoxicity of heterocyclic nitrogen compounds. He told the results of some eleven years of research on structure in relation to fungitoxicity, during which time 115

(*Turn to Page 87*)

Photo Courtesy Chemical & Engineering News

Participants in the fungicide symposium at Philadelphia: (back row, L to R): Dr. R. H. Gruenhagen, Dow Chemical Co., Midland, Mich.; Dr. R. H. Wellman, Carbide & Carbon Chemical Division, Union Carbide & Chemical Corp., New York; Dr. George L. McNew, director, Boyce Thompson Institute for Plant Research, Yonkers, New York; and Dr. J. L. St. John, Washington State College, Pullman, Wash., chairman of the ACS Subdivision.

Front row: Dr. J. G. Horsfall, director, Connecticut Agricultural Experiment Station, New Haven; Dr. W. H. Tisdale, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.; Dr. F. R. Whaley, Linde Air Products Co., Tonawanda, N. Y.; and Dr. S. E. A. McCallan, Boyce Thompson Institute

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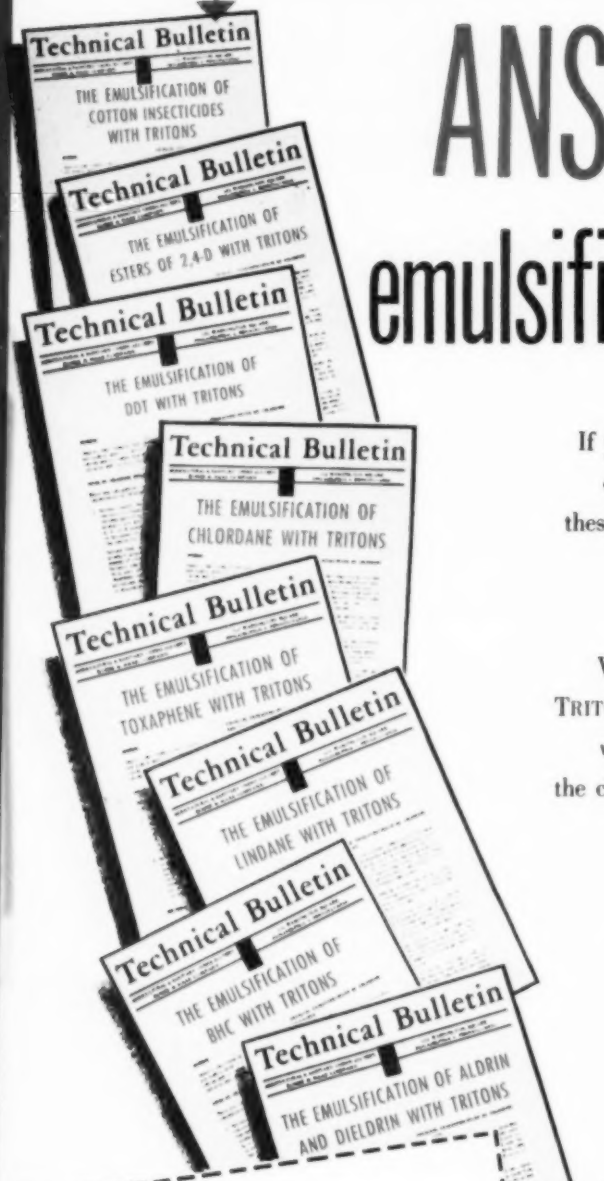

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Alabama Short Course Discusses Use of Insecticides for the

Control of Cotton Insects

ALABAMA Polytechnic Institute's first short course on agricultural chemicals and their application in the field, was held at Auburn, Alabama, March 20 and 21, 1950. The 100 persons in attendance included crop dusters and sprayers, pesticides manufacturers and salesmen, growers, and others interested in pest control. The majority was from Alabama, but a considerable number was also in attendance from Georgia, Florida, and other states. Co-sponsors of the course were the State Department of Aeronautics and the Alabama Flying Farmers Association.

Dr. R. B. Draughon, API President, welcomed the visitors to Auburn and expressed satisfaction in seeing teaching, research, and extension personnel combining their efforts with manufacturers, applicators, and farmers in attaining maximum control of insects and diseases. Dr. M. J. Funchess, Dean of the School of Agriculture and Director of the Agricultural Experiment Station, spoke briefly on the purpose of the course, emphasizing the importance of effective pest control at low cost as an essential step in profitable agriculture.

Cotton Pest Control

OF major interest was the discussion on cotton insects and their control, since more agricultural chemicals are used on cotton in Alabama than on any other crop. Professor F. E. Guyton, of the Department of Zoology-Entomology, gave an illustrated lecture on recognition, life-history, and habits of cotton insects and other major pests. Emphasis was placed on boll weevil, cotton aphid, and bollworm. Dr. F. S. Arant, Head of the Department of Zoology-Entomology, discussed toxicity, formula-

(*Turn to Page 91*)

In The Photos

Top row (L to R): R. L. Sell, Associate Professor of Botany and Plant Pathology, Alabama Polytechnic Institute; Coyt Wilson, Plant Pathologist, Agricultural Experiment Station; and J. A. Lyle, assisant Plant Pathologist, Ag. Experi. Station.

Middle row: W. A. Ruffin, Extension Entomologist, API; George R. Williamson, Manager, Agricultural Sulphur & Chemical Co., Montgomery, Ala.; F. E. Guyton, Prof. of Zoology-Entomology, API; and W. G. Eden, assistant Entomologist; Agri. Experi. Station.

Bottom Row: Asa Rountree, Director, Alabama Dept. of Aeronautics; Robert G. Pitts, Dept. of Aeronautical Engineering, API; F. S. Arant, Head of Dept. of Zoology-Entomology, API; T. E. Corley, assistant Agricultural Engineer, Agri. Experi. Station; and L. H. Smith, president, Alabama Flying Farmers Association.

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The Listening Post

Use of Fungicides to Control Plant Disease

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

ACCORDING to B. F. Dana of the U. S. Bureau of Plant Industry, Soils, and Agricultural Engineering, and Edward K. Vaughan, of the Oregon Agricultural Experiment Station, the economic importance of white mold caused by the fungus *Sclerotinia sclerotiorum* has led to an expansion of research on the control of this disease, particularly as it affects the culture of the Blue Lake type of beans so important in that region. The joint program of investigation initiated in 1947 by the Bureau and the Experiment Station included experiments in control by fungicides applied as dusts or sprays. Data obtained in 1948, which were reported in the "Listening Post" for February 1949, were the basis for an expanded program during the 1949 growing season. The following account of 1949 results is taken from the report of these two plant pathologists.

Adequate testing of the effectiveness of fungicides for its control required severe and uniform occurrence of the disease. In order to create an epidemic the investigators employed all the factors known to favor the development of white mold. For restricted aeration the experimental area was located in a low section where surrounding brush served as a windbreak, and was edged by a wide border planted to tall-growing corn. Within this area three plots were separated by strips of corn to facilitate work with three groups of fungicides. Over-irrigation was accomplished by overhead sprinkler-irrigation applied at weekly intervals by night runs of eight to ten hours. The high level of humidity in these plots was indicated by heavy dew each night. Close row spacing and heavy foliage growth also favor white mold. Rows were spaced four feet apart in the experimental plots. Heavy foliage growth was induced by heavy nitrogen fertilization. Under these conditions plants grew to a height of six feet or more and spread to form rows eighteen inches or more in width. The conditions of high humidity and restricted aeration in these plots were considered to be fully as favorable for development of infections as any that could be found in commercial fields.

Besides supplying exceptionally favorable conditions for the fungus, steps were taken to supplement the amount of *Sclerotina* occurring naturally, so that inoculum, i.e., fungus material ready to start infection, would be abundant and uniform in the plots. Diseased bean plants from the 1948 plots left on the soil supplied heavy inoculum over the part of the plot area used in 1949. Refuse containing sclerotia, or resting bodies of the fungus, from cabbage and pumpkin were distributed over the experimental area to parallel the crop history of some of the commercial areas used for beans. Additional uniform inoculation was accomplished by sowing sclerotia from cultures along the row when the bean plants were six to eight inches high. These sclerotia were grown in the laboratory and conditioned by alternate freezing and thawing for two weeks, followed by weathering under thin layers of soil. This inoculum was applied to treated rows and to adjacent border rows.

Heavy inoculation and heavy irrigation at weekly intervals with restricted air circulation raised the disease potential in 1949 to a very high level. The level of actual infection in untreated and border rows was remarkably uniform throughout the experimental area. The investigators state that the infection potential and actual amount of disease present were equal to or above any localized occurrence in commercial fields observed by them, and believe that the uniformity of severe infection potential is a basic factor in a true appraisal of the effectiveness of the fungicides used in their study.

TABLE 1

FUNGICIDES APPLIED AS DUSTS

Infection Centers Per Thirty-Two-Foot Row: Mean of Five Replicates

Week of		1 Zerlate	2 Zerlate + Sulfur	3 C.O.C.S. + Kolodust	4 Flotox	5 Kolodust	6 Bismuth Subsal.	7 No Treatment
				Aerial Infection Centers				
Aug.	15	0.4	1.8	0.8	0.4	1.0	0.8	1.4
	22	2.6	11.6	8.2	5.6	13.2	11.0	13.4
	29	6.6	26.0	25.8	13.8	27.6	23.2	33.0
Sept.	5	28.4	62.2	54.6	43.0	61.2	48.6	76.2
				Basal Infection Centers				
July	18	2.2	0.6	0.4	0.8	1.0	1.4	1.2
	25	6.2	5.2	5.4	4.0	5.2	7.0	5.8
Aug.	1	7.8	7.6	6.6	7.0	7.0	8.6	8.8
	8	9.6	9.4	7.4	8.4	7.2	9.8	8.8
	15	10.2	9.8	8.2	8.6	9.2	11.0	9.8
	22	11.4	10.4	9.6	9.0	9.6	12.8	10.8
	29	11.8	10.8	9.6	9.0	9.6	13.0	11.6
Sept.	5	15.0	17.6	18.6	11.4	16.6	22.2	22.2

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Fungicides & Application

FUGICIDES used in 1949 included those which gave appreciable control in the 1948 tests, and additional selections made on the basis of value in the control of other diseases as reported by various workers. The fungicides were arranged in three groups; each group was applied to a separate series of plots randomized with untreated plots.

Dusts (Table 1)—"Kolodust" and a copper-sulfur dust gave favorable results in the 1948 trials, as did "Zerlate" and bismuth subsalicylate used as sprays. In 1949 "Kolodust," "Zerlate," bismuth subsalicylate, and "Flotox" were used singly as dusts. Two combination dusts were made up as follows: one part C.O.C.S. (copper oxychloride sulfate) plus four parts "Kolodust," and one part "Zerlate" plus nine parts sulfur.

Sprays (Table 2, Table 3)—Two groups of fungicides were applied as sprays. Plots sprayed with "Zerlate" and bismuth subsalicylate in 1948 showed low infection counts. These and "Sulforon" were used singly in 1949. A combination of one part "Zerlate" and four parts "Sulforon" was used in the fourth spray treatment. "Triton B-1956" was used as a spreader-sticker with all sprays. The second group of fungicides applied as sprays were materials not previously used in this project. "Crag #658" (Cu Zn Chromate L658), "Fermate," "Cop-O-Zink," "Monsanto CP-546," and "Actidione" were applied singly. One part "Fermate" and four parts "Sulforon" were used together for the sixth spray in this group.

The first application of the fungicides was made July 25 and applications were continued at weekly intervals until August 29. Although forty-eight hours intervened between irrigation and fungicide application the soil was still very wet and the plants were covered with dew in early morning at the time dusts were applied. Spray applications were made later in the same day. Both sprays and dusts were applied under conditions considered to be favorable for maximum adherence of the fungicide.

TABLE 2

FUNGICIDES APPLIED AS SPRAYS

Infection Centers Per Thirty-Two-Foot Row: Mean of Five Replicates

Week of		1 Zerlate	2 Sulforon	3 Zerlate +Sulforon	4 Bismuth Subsal.	5 No Treatment
		Aerial Infection Centers				
Aug.	15	0.0	0.0	0.0	0.0	0.2
	22	3.8	5.2	4.2	5.2	14.0
	29	15.4	18.0	9.6	18.4	35.6
Sept.	5	53.2	52.4	35.8	55.2	93.6
		Basal Infection Centers				
July	18	2.4	2.0	0.8	2.4	0.6
	25	6.8	5.4	4.2	7.2	2.6
Aug.	1	9.2	6.4	5.6	8.8	4.0
	8	10.0	7.2	6.8	9.6	6.2
	15	12.6	8.8	8.2	11.8	7.6
	22	12.6	9.2	8.4	11.8	8.8
	29	12.8	9.4	8.4	12.6	9.0
Sept.	5	14.2	14.0	10.2	13.8	21.0

Records of Infection

RECORDS of new infection centers were made at weekly intervals for all plots. These records were started July 18 when only basal infections were to be found. No apothecia were found at this early date and these infections are believed to have originated from contact with mycelium, i.e., fungus threads or growing stage, in the soil. On culture media mycelium develops readily from the sclerotia and may also develop from these structures in or on the soil.

Aerial infections were first found the week of August 15. These were not in contact with the soil. The spore stage of the fungus appeared at the period when soil along the row became shaded by heavy growth of foliage at the base of the plants. This was also the period when the first green beans were ready for picking.

Aerial infection data are assembled in Tables 1 to 3. Averages are given of the counts of infection centers for the replicated plots for each fungicide and the no-treatment plots, for each of the three groups of fungicides. These average totals are given for each week extending from July 15 to September 5.

Fungicides do not control basal infections: The counts of basal infec-

(Turn to Page 93)

TABLE 3

FUNGICIDES APPLIED AS SPRAYS

Infection Centers Per Twenty-Six-Foot Row: Mean of Four Replicates

Week of		6 Crag #658	7 Cop-O-Zink	8 Fermate	9 Fermate +Sulforon	10 Monsanto CP-546	11 Actidione	12 No Treatment
		Aerial Infection Centers						
Aug.	15	0.25	1.75	0.75	0.25	3.00	2.00	12.75
	22	15.75	7.00	10.25	3.50	17.00	21.75	37.25
	29	24.50	14.25	22.75	9.50	32.50	33.25	58.25
Sept.	5	40.00	28.75	40.25	22.75	60.25	59.75	76.50
		Basal Infection Centers						
July	18	1.00	1.25	0.50	1.00	2.50	0.50	0.50
	25	2.00	3.00	2.00	3.00	4.50	1.50	2.00
Aug.	1	2.25	3.25	2.00	3.75	4.50	2.25	2.50
	8	2.75	3.50	2.00	3.75	4.50	2.25	2.75
	15	5.00	4.00	2.50	4.00	6.25	4.25	7.50
	22	6.00	4.50	3.00	4.25	7.00	6.50	9.25
	29	6.25	4.75	3.00	4.25	7.50	7.00	9.50
Sept.	5	13.00	10.25	6.75	6.25	16.00	14.50	23.00

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Record of Recent Insect Infestations

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Dr. Haeussler is in charge of Insect Pest Survey and Information, Agric. Research Adm., B. E. & P. Q., U.S.D.A. His observations are based on latest reports from collaborators in the department's country-wide pest surveys.

By G. J. Haeussler

ALTHOUGH rather low in numbers, Mexican bean beetle adults continued to occur on early beans in Florida, showing but little activity early in the month. Toward the end of the month, however, they were becoming more numerous and were depositing some eggs. The pests were not limited to Florida, for a few adults were reported from Georgia at that time. In Georgia, also, infestations of the serpentine leaf miner ranged from light to moderate on beans during the early portion of March.

Other bean pests were noted not only in Georgia and Florida, but in Franklin Parish, Louisiana as well. These included light infestations of the bean leaf roller, cutworms, thrips and two-spotted spider mite in Florida, light infestations of the banded cucumber beetle in Florida and Georgia, and a severe infestation of the vegetable weevil in the Louisiana area.

The heavy aphid populations that occurred on crucifers in many parts of the South and in southern California earlier declined in most areas during March. However, these insects continued to cause serious damage in some parts of Florida, Mississippi, and Louisiana. Cabbage caterpillar populations continued generally light to moderate in all parts of the South and also in California. Infestations of the vegetable weevil continued serious on crucifers in most southern States during the month. The striped flea beetle continued to infest mustard and turnips in Louisiana, although the infestations were apparently lighter than during February. Slugs also caused some injury to cabbage in that State. Reports indicated that the yellow-margined leaf beetle was widely distributed on cole crops in the southern part of Mobile County, Alabama, but no serious damage was reported. Vegetable weevil infestations continued serious on crucifers in most of the Southern States throughout the month, however.

A light infestation of the pea aphid appeared on peas in South Carolina around the middle of March. Moderate to heavy infestations of this aphid were infesting some pea fields in Orange and Ventura Counties, California, during the latter part of the month, requiring insecticide treatment in some instances. Lighter infestations occurred on peas in Santa Barbara and Kern Counties. A large acreage of alfalfa in the Antelope Valley of California was seriously damaged by a pea aphid population that was still increasing in late March.

Aphid infestations occurred widely on a number of other vegetables throughout the South. Crops infected included: eggplant, pepper, watermelon, tomato, celery, radish, squash and cucumber in Florida; spinach in Virginia; lettuce, sugar beets, peppers, and strawberry in Southern California; and a severe infestation on lettuce in the Salt River Valley of Arizona which required insecticide applications in some fields.

The two-spotted spider mite caused serious damage to strawberry in parts of Virginia, North Carolina, and California during March, and occurred in moderate numbers on celery, eggplant, cucumber, potato, sweet potato, and strawberry in Florida.

Moderate to severe infestations of onion thrips were reported on onions and garlic in Louisiana, and on onions in South Carolina, Georgia, and California.

The serpentine leaf miner was present in light to serious numbers on eggplant, tomato, pepper, and squash in Florida. Toward the end of the month the pepper weevil was

(*Turn to Page 93*)

Tolerance Hearings Examine Fungicides

THE first phase of the spray residue tolerance hearing relating to the necessity for use of insecticides is in its final stages. The presentation of testimony by public officials was completed with the testimony of the American Phytopathological Society relating to the necessity for using fungicides. This testimony was prepared and presented under the guidance of a committee of the American Phytopathological Society, headed by Dr. George L. McNew, Director of Boyce Thompson Institute. This testimony centered around a compilation of replies received from thirty-five different states, showing the various plant diseases of fruits and vegetables, extent of damage caused by these diseases, and the various chemicals which have been found to be satisfactory for their control.

Doctor McNew traced the historical background of the use of fungicides, starting with the development of Bordeaux mixture, and discussed the economic importance of fungicides.

The next witness on behalf of the Society was Dr. Paul R. Miller, Senior Pathologist of the U. S. Department of Agriculture's Bureau of Plant Industry, whose testimony was concerned with methods of appraising and reporting plant disease losses. He discussed the details of reports on plant disease conditions collected by observers in the various states, and cited the effectiveness of forecast services in warning growers to prepare for various diseases.

Dr. S. E. A. McCallan, also of the Boyce Thompson Institute, was another witness for the Society. He testified in regard to the economic importance of various groups of fungicides used on several fruits and vegetables. His testimony included statistics on the annual consumption of a detailed list of fungicides.

Dr. Robert S. Kirby, professor in charge of plant pathology extension work of Pennsylvania State College, discussed methods used in Pennsylvania to evaluate and record the effectiveness of fungicide treatments over a long term period. He mentioned diseases affecting several fruits and vegetables and fungicides recommended for their control.

Dr. James G. Horsfall, Director of the Connecticut Agricultural Experiment Station, covered the historical development of fungicide research and discussed fungicides and their action. One of the difficulties with which manufacturers of fungicides are confronted, he stated, is the great difference in the effectiveness of fungicides when tested in the laboratory and used in the field.

Testimony covering the use of fungicides for the control of diseases

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Technical Briefs

Fertilizer-"TCA" Mixture

Dow Chemical Co., Midland, Mich., has announced that tests with "Sodium TCA" show that it may be applied in a dry form mixed with fertilizer or other carrier such as superphosphate and applied with a fertilizer spreader. The herbicide is usually applied in spray form to suppress or control grasses. Suggested application may be made with four parts or more of the carrier, Dow says, with the application rate being based on the "TCA" content of the final mix. Use of a double disc harrow directly following application will help to obtain uniform distribution, it is said.

•

2,4-D in Strawberry Beds

If spraying is done at the proper time, 2,4-D may be used in strawberry beds for control of broad-leaved weeds. However, the applications must be made before the first strawberry blossoms open, according to Dr. Otis F. Curtis of the New York State Agricultural Experiment Station, Geneva, who has been making tests in strawberries. His conclusions were reached after experiments had been made with 2,4-D sprays on a number of varieties and unnamed seedlings of strawberries.

Although the tests were termed satisfactory, the weed sprays did result in a slight reduction in yield as compared with hand weeding. But compared with the nearly total loss suffered when weeds are uncontrolled, a possible reduction from use of 2,4-D would be negligible, he points out. There is also an added benefit from ease of picking where chemical weeding has been done.

The equivalent of 1 pound of 2,4-D acid per acre at any time except between flower opening and fruit picking will be adequate, it is pointed out. "One-half pound might suffice when the weeds first appear after setting out the bed, to be followed by a second treatment," Dr. Curtis states. "Even a 2-pound rate might be worth trying on old weedy beds or for spot spraying of scattered weedy patches," he concludes.

•

Parathion for Greenbugs

Parathion is reported as the most effective insecticide for control of greenbugs, in a paper by R. G. Adams on the studies of the Oklahoma Agricultural Experiment Station. Tetraethyl pyrophosphate is satisfactory only at temperatures above 75° F, applied in doses of four to five ounces per acre, he reports. Benzene hexachloride gives erratic results and control. It is injurious to barley and, therefore, not recommended.

It is pointed out that parathion can be applied as a spray or dust, but in either case, it should be applied only with power equipment, since it is hazardous to the operator of hand type sprayers and dusters. For satisfactory distribution, the mixture should be agitated continuously in the tank during application. The parathion is available as (1) a 1 or 1½ percent dust, (2) wettable powder of 15 to 25 percent, or (3) emulsifiable concentrate of 15 to 25 percent. Recommended dosages in pounds per acre are, respectively: (1) 20, 15; (2) 1½, 1; and (3) 1½, 1. The powders are used in 8 gallons of water when applied on the ground, or 2 to 2½ gallons for application by airplane.

All three of the insecticides mentioned are toxic to man and animals and should be handled with care and only by experienced operators. Insecticides coming in contact with the skin should be washed off immediately. If taken internally the person should be treated by a doctor. Atropine, applied to the limit of the patient's tolerance, is an effective antidote.

Since the TEPP residues disappear readily, grains may be pastured in three days after application; parathion and BHC residues, however, remain longer, and grain should not be pastured for two weeks after application.

•

Seed Protectants Tested

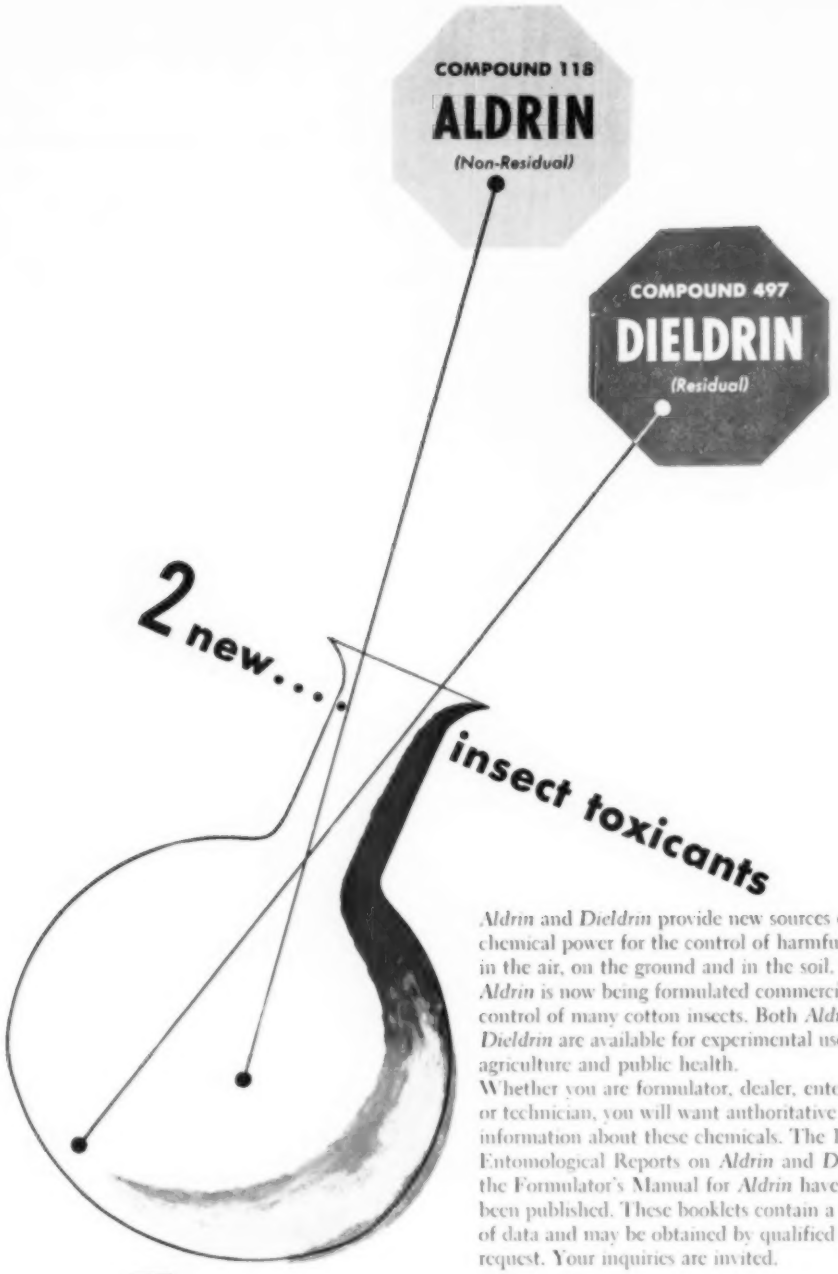
From a series of 640 chromate or organic compounds evaluated as possible seed treatments by greenhouse tests on peas and other seeds, there were selected as promising seed protectants the following four compounds: mercury-zinc-chromate complex, 0.4 $HgO.3ZnO.CrO_3$ (No 224); copper - zinc - chromate complex, $4CuO.Zno.1.3CrO_3.5H_2O$ (No. 640); cupric γ-chloroacetoacetanilide, cupric salt of $ClCH_2COCH_2CONC_6H_5$ (No. 854); and the reaction product of dimethyldithiocarbamate and sulfur dichloride (No. 5400). A fifth compound, γ-chloroacetoacetanilide (No. 201), also gave good protection, but was later eliminated because of skin irritation to humans.

Limited storage tests indicate no reduction in the effectiveness of the chemical or deleterious effect on the seed of those crops on which they gave good field results. Preliminary toxicological tests on animals indicate no unusual health hazards.

These experimental compounds were tested under field conditions in comparison with standard protectants, especially thiram and chloranil, on pea, spinach, beet, lima bean, cucurbit, cabbage, snap bean, tomato, and corn. Field tests on some or all crops were performed in 1949 at seven different stations representing New York, New Jersey, Ohio, Iowa, and Florida. Greenhouse tests were made on sorghum.

The mercury - zinc - chromate was the outstanding material tested on corn ranking high for mean of all stations; in addition, it placed ahead of the standard treatments in each of three years' yield tests in Iowa. Good results were also obtained on pea, cabbage, and sorghum and fair results on spinach and cucurbit. However, it is decidedly injurious to lima bean and probably ineffective on beet, snap bean, and tomato.

The copper - zinc - chromate



Aldrin and *Dieldrin* provide new sources of chemical power for the control of harmful insects—in the air, on the ground and in the soil. *Aldrin* is now being formulated commercially for the control of many cotton insects. Both *Aldrin* and *Dieldrin* are available for experimental use in agriculture and public health.

Whether you are formulator, dealer, entomologist or technician, you will want authoritative information about these chemicals. The 1949 Entomological Reports on *Aldrin* and *Dieldrin* and the Formulator's Manual for *Aldrin* have just been published. These booklets contain a wealth of data and may be obtained by qualified persons on request. Your inquiries are invited.

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ranked first on pea. Fair results were obtained on the other crops excepting lima bean to which it is probably injurious.

Cupric γ-chloroacetoacetanilide is effective for pea, corn, cabbage, and sorghum and fair for the other crops.

The reaction product of dimethyldithiocarbamate and sulfur dichloride (No. 5400) ranked first on lima bean, corn, and cabbage and also was good on beet and cucurbit and fair on the other crops. It is the most generally effective of all the compounds tested.

—S. E. A. McCallan in Contributions from Boyce Thompson Institute, Vol. 16, No. 1, January-March, 1950.

•

No DDT Harm to Bees

That DDT is not harmful to honeybees was stated in the 1947 report of the Canadian Dominion Experimental Farms, recently published by the Canadian Department of Agriculture. Because of the increasing use of DDT for control of injurious insect pests in fruit, seed and vegetable growing areas, beekeepers in fruit growing areas became alarmed as to the effect this particular toxicant might have on their bees. Consequently, tests were made, with results as reported in the recently-published book: " . . . Just prior to the opening of apple blossoms, three full colonies of bees were placed in a four-acre orchard at the Central Experimental Farm, Ottawa. A special trap to catch dead bees was placed in front of each colony. Another group of colonies was established well beyond the danger zone to act as checks. Delayed-dormant, pre-pink and pink sprays had already been applied to the orchard but these did not contain poison.

"As soon as the apple bloom was fully opened the trees were sprayed with a solution containing DDT 50 per cent, 2 pounds per 100 gallons of spray. Actually two applications were made, as the early-blossoming varieties were sprayed five days earlier than the later varieties, thus providing a double opportunity for poisoning the bees. A later spray (calyx), containing DDT, was also applied when most of the blossoms had fallen.

"The bees were working the flowers well at the time the sprays were being applied but were driven off by the force of the spray being delivered. They were back, however, and working the flowers again quite freely even before the spray had dried.

"Collections of dead bees were made from the traps and also from beneath the fruit trees every few days until well after all fruit bloom had disappeared. During the period, examinations were made of the colonies to find out if the poison had affected the brood. Similar examinations were also made of the check colonies. All samples of dead bees were subjected to chemical analysis for the presence of DDT. In only one sample was DDT found in sufficient quantity to be suspected as the cause of death.

"At no time during the experiment was the death rate of adult bees, or of brood, any higher than that which occurred in the check apiary. The results obtained during 1947 were identical to those secured in 1946.

"The experiment was rather drastic in that the poisons were applied while the trees were in full bloom and the bees worked the sprayed blossoms quite heavily. Under normal conditions, no spray would have been applied during the period of open bloom. The results secured from the project prove beyond doubt that under normal field conditions DDT is not harmful to honeybees."

•

Tomato Disease Control

Losses due to foliage diseases of tomatoes amount to an estimated 20 percent of the annual value of the Hawaiian island tomato crop. The principal diseases responsible are gray leaf spot, early blight, late blight, and *Septoria* leaf spot. These diseases are particularly harmful during the winter months when, because of the generally higher prices paid by the local market, many growers would prefer to make major plantings. However, because of excessive defoliation, many farmers are forced to produce this crop only during the summer months.

The results of three tests show that plots sprayed from 7 to 12 times with certain of the newer organic fungicides and with some of the copper fungicides gave significant increases in yield of marketable fruits.

"Zerlate," used at 2 pounds per 100 gallons of water, gave a very high degree of control of gray leaf spot, early blight, and *Septoria* leaf spot whenever these diseases prevailed. "Fermate," tribasic copper sulfate, "Parzate," and "Yellow Cuprocide" likewise afforded excellent protection. "Dithane D-14"-zinc-lime increased the yield of marketable fruits in the two Poamoho tests, but failed to increase the yield at Makawoa, Maui.

The highest yields of marketable fruits in the 1944-45 test were obtained from plots sprayed with "Zerlate," tribasic copper sulfate, "Yellow Cuprocide," "Fermate," "Spraycop," and "Dithane"-zinc-lime, in the order listed. In the second test, 1946-47, the highest yields were obtained with the use of "Zerlate," tribasic copper sulfate, "Dithane"-zinc-lime, "Fermate," and "Yellow Cuprocide," in the order listed. In the third test, the use of tribasic copper sulfate provided the greatest yield, followed in descending order by "Yellow Cuprocide," "Zerlate," and "Parzate."

The net value of the increased yield was over $1,600 per acre for "Zerlate" and tribasic copper sulfate in the 1944-45 test, $1,000 for "Fermate" and "Yellow Cuprocide," and $800 for "Dithane"-zinc-lime and "Spraycop 340." Similar values were obtained in the second test. The net value of "Zerlate"-sprayed plots was more than $1,600 greater than the unsprayed check. In this test "Dithane D-14"-zinc-lime and tribasic copper sulfate increased the value of the crop by $1,000 and "Fermate" and "Yellow Cuprocide" by $800. In the Maui test net gains of $600, $500, and $300 were obtained from tribasic copper sulfate, "Yellow Cuprocide," and "Zerlate," respectively.

—*Bulletin* 101, *University of Hawaii Agricultural Experiment Station, February*, 1950.

Chemicals Increase Yield

Alabama Experiment Station, Auburn, in its 58th and 59th annual reports recently released, has recommended three dusting treatments for general use to control cotton boll weevil, bollworm and cotton aphid in that state. These treatments are: (1) 20 percent toxaphene; (2) BHC-DDT mixture (3 percent gamma-5 percent DDT); and (3) alternate application of calcium arsenate alone, and calcium arsenate containing 2 percent nicotine, or alternate application of calcium arsenate and BHC-DDT, 3-5 mixture. These are based on extensive tests to determine the relative effectiveness of various dusts.

Over a two year period, the report says, 51 replications of 20 percent toxaphene resulted in an average gain of 532 lbs. per acre of seed cotton over undusted cotton; 26 replications of BHC-DDT, 3-5 mixture, resulted in a gain of 440 lbs. per acre; three applications of an effective insecticide applied just as the cotton began squaring failed to increase the yield, whereas five dustings made while the crop was being set and matured increased significantly the yield of seed cotton per acre.

In laboratory experiments for control of boll weevil and other major cotton pests, BHC was much faster in toxic action against boll weevil than any other insecticide tested. Its residual effect, says the report, was sufficient to cause 100 percent mortality of weevils placed on dusted cotton exposed two days to sunshine and wind.

Toxaphene was somewhat slower in action than BHC but its residual action was sufficient to cause a net mortality of 85 percent to boll weevil adults, placed on foliage four days after dusting. Chlordane and calcium arsenate were slow in action. Residual effect of calcium arsenate was of the same order as toxaphene, while residual effect of chlordane was shorter than that of BHC.

DDT and toxaphene dusts were effective in control of thrips and leafhopper on peanuts in Alabama tests and also increased yields at varying rates. Where sulfur-copper dust

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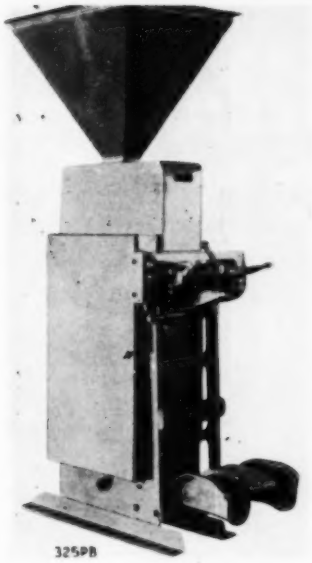
Suppliers' Bulletins



A new automatic packer (above) for filling multiwall fertilizer bags has been developed by the Engineering & Machine Div. of St. Regis Paper Company and designed to supplement the company's faster 160-FB fertilizer packer. The new packer, known as the 325-PB, embodies the filling principles of the 160-FB and is engineered to meet the needs of smaller fertilizer plants.

The two fertilizer packers round out the Company's line of filling machines to meet the packaging requirements of large and small fertilizer producers.

On the basis of field operations, the 325-PB packer in average production is said to fill seven to eight 100-pound multiwall paper fertilizer bags per minute with one operator, or between 20 and 24 tons of fertilizer an hour. A single 160-FB packer, however, can fill up to 36 tons an hour with one operator.

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Distributes "Fumigun"

Innis, Speiden & Co., New York, have been appointed distributors for "Fumigun," a hand-operated injector for application of soil fumigants. The appliance is made of brass, stainless steel, and aluminum, with no gaskets or packing, it is stated. Injections to a depth of 3½ inches or 6 inches are made with the Fumigun, according to the announcement. It has a tank capacity of three quarts, and will deliver from 1 to 10 cc of liquid per shot, as desired.

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Spraying Booklet Out

A new booklet, "Spraying Program and Pest Control for Fruit Crops" has been issued by the Agricultural Extension of Ohio State University, Columbus. The brochure contains tables on early season apple sprays, for all orchards; summer program; special, or emergency sprays for apple; and complete schedules for peach, sweet cherry, sour cherry, plum, prune, grape, strawberry and raspberry sprays. Each table presents the name of the insect or disease, the nature of injury to be seen, and the proper materials to use in the control. Also given is a full page of cautions to be observed in the use and handling of the more toxic materials.

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Parathion Handling

Monsanto Chemical Co., St. Louis, has issued a little booklet giving complete instructions on how to handle Parathion safely. Information includes storage and opening of drums, formulating, safety for workmen, and advice about application. One page gives full instructions for first aid in case of accident, and another is for the use of any physician who might be called in on a case. The booklet ends with the statement, "If you follow these directions exactly, parathion's wallop will hurt only the insects—you will be perfectly safe." Copies are available from the company, 1766 S. Second St., St. Louis 4, Mo.

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Offers New Spray Boom

A new type orchard spray boom has recently been introduced by Hurst Industries, Inc., San Jose, California. This boom incorporates features that permit positive tractor seat control and impinging-jet nozzles of entirely new design. The boom provides three aqua-jet nozzles on each side. Each group can be operated separately or together by means of a hydraulic control mounted at the tractor seat.

The aqua-jet nozzle is of the constant volume, long-reach type. Two fluid streams meet after leaving

the jet tips to produce a flat, fan-shaped plume of minute particle size. The angle of the jets is adjustable to change the reach or width of the spray pattern, adapting it to various types of trees. Interchangeable tips permit discharge of from two to thirty gallons per minute per head. According to the manufacturer, the boom can be installed on sprayers having a tank width between thirty and fifty inches.

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USDA Bulletins Out

"Preliminary Tests of Plant Materials as Insecticides" is the title of Bulletin E-796 published by the U.S.D.A. Bureau of Entomology and Plant Quarantine. The 35-page report was prepared by G. T. Bottger, Division of Control Investigations and Martin Jacobson, Div. of Insecticide Investigations. The report covers results of toxicity tests with 197 plant materials at Sanford, Fla., and Anaheim, California. For comparative purposes, tests were made with barium fluosilicate, DDT, derris, lead arsenate, lindane, bis (*p*-chlorophenoxy) methane, parathion and pyrethrum.

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INDUSTRY NEWS

O. F. Smith, Fertilizer Manufacturer, Dies

Oscar F. Smith, president of Smith Douglass Co., Inc. fertilizer manufacturers, Norfolk, Va. and also prominent in civic and philanthropic circles, died unexpectedly May 4

OSCAR F. SMITH

while exhibiting one of his favorite saddle horses at a Greensboro, N. C. horse show. Mr. Smith, 58, was one of the original incorporators of the American Plant Food Council, and had been connected with the fertilizer industry since he was 19 years of age.

His fertilizer career began at the plant of J. R. Young Fertilizer Co., Norfolk, where he was employed as a foreman. He advanced rapidly, becoming superintendent in six months, and holding the post from 1911 to 1920 at which time he joined with Robert B. Rowland, Jr., in organizing a nitrogenous tankage plant at Money Point, Va. Conditions then were not conducive to development of their new process, and about a year later, he bought out his partner. Despite several reverses, including a fire which destroyed the tankage plant, Mr. Smith undertook a plan of mixing fertilizer by hand, erected a much larger tankage plant, and formed the Smith Reduction Company which he operated until 1927.

That year he joined R. B. Douglass, former vice president of the Eastern Cotton Oil Co., in forming the Smith Douglass Co., Inc., coincidental with the erection of the original plant at the outskirts of Norfolk. This plant has subsequently been enlarged until it is now one of the largest mixed fertilizer operations in the world.

At present, the company operates a second branch in the Norfolk area; and other plants near Boston, Mass.; Danville, Va.; Kingston, N. C.; Wilmington, N. C.; Streator, Ill.; Shreveport, La.; St. Louis, Mo., and Albert Lea, Minn.

In addition to his activities pertaining strictly to the fertilizer field, Mr. Smith was interested in various philanthropies, in the raising of fine horses, and in civic affairs. He was a trustee of Elon College, a trustee of the Norfolk Museum of Arts and Science, president of the board of directors of Leigh Memorial Hospital, a director of the Seaboard Citizens National Bank, and chairman of the Norfolk Port Authority. In 1947 he was presented the Distinguished Service Award by Norfolk's Cosmopolitan Club.

APFC Statement

With the deepest regret we report the death of Mr. Oscar F. Smith, President of Smith-Douglass Co., Inc., Norfolk, Virginia, a distinguished businessman and one of the most beloved and widely-known men in the fertilizer industry.

Mr. Smith was one of the original incorporators and staunchest supporters of the American Plant Food Council and he will be missed greatly in the affairs of the industry to which he devoted his life.

His death resulted from a heart attack while he was participating in a horse show at Greensboro, North Carolina.

We join with members of the Council in expressing our deepest sympathy to Mrs. Smith, the officials and employees of the Smith-Douglass Company and the host of personal friends he has made over the years.

Sincerely,
Clifton A. Woodrum

Carpenter New Sales Mgr.

A. H. Carpenter has been appointed eastern sales manager of the Agricultural Chemical Division of Mathieson Chemical Corporation, according to S. L. Nevins, vice president, director of agricultural chemi-

A. H. CARPENTER

cal sales. Mr. Carpenter succeeds Joseph S. Whittington who has been transferred to the executive offices of the agricultural chemical division, where he will devote his time to research and development work.

Mr. Carpenter is a native of Virginia, and was with the Armour Fertilizer Works for 27 years before joining Baugh & Sons Co. in 1947.

•

LeRoy Bemis Sales Mgr.

Robert B. LeRoy, formerly head of the Paper Control Laboratory of Bemis Bro. Bag Co. in St. Louis, has been appointed sales manager of the Bemis multiwall paper bag plant in East Pepperell, Mass. The position was formerly held by C. H. Waterous who is on leave of absence because of ill health.

Mr. LeRoy joined the Bemis company in 1938 as a member of the New York Sugar Bag Sales Division, and in 1944 was transferred to East Pepperell to develop and direct the multiwall packaging research laboratories there. He was transferred to

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Dept. H3

the Bemis General Production Department in St. Louis in 1948 to establish the Paper Control Laboratory.

New head of the Paper Control Laboratory is Arthur R. Ewing, formerly laboratory technician at the Bemis plant in Peoria and technical assistant to the superintendent of the paper mill there. He joined Bemis at Peoria in 1924.

•

New SW Fertilizer Plant

Production is under way at the new plant of Bulk Fertilizers, Inc., Carlsbad, N. M. The new enterprise, with Carl O. Hanson as manager, will handle both bagged and bulk fertilizer, and will produce analyses especially for the growers in that area. The firm also plans later to apply the fertilizer to the land at a reduced cost, and is making plans to handle liquid nitrogen fertilizer for direct application through irrigation water.

The firm has an authorized capital stock of $100,000 and is starting business with $1,000 in capital stock actually issued, it is reported. Stockholders, aside from Mr. Hanson, are E. W. Douglass and R. E. Pritchett.

•

Mathieson Opens 3 Plants

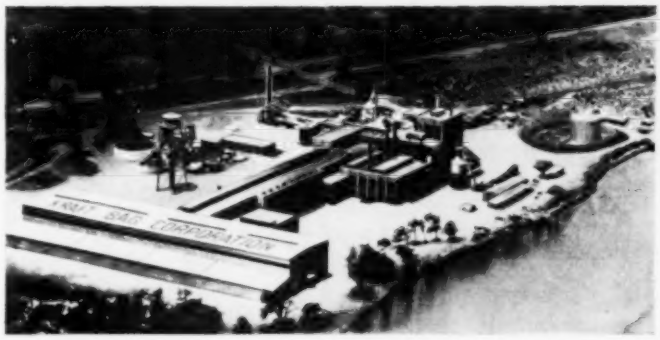
Mathieson Chemical Corporation began production of agricultural insecticides and fungicides at Little Rock Arkansas, and Williamston, North Carolina, early in May, with another plant at Houston, Texas, scheduled to come in later in the month, according to S. L. Nevins, vice president and director of Agricultural Chemicals Sales.

All of the new units will be located in convenient proximity to Mathieson's fertilizer plants or distributing warehouses in those cities, and their truck loading facilities are expected to enable customers to pick up a combination load of fertilizers and insecticides at the same time.

Manufactured in accordance with the recommendations of agricultural colleges, experiment stations and extension services, strict laboratory controls will be maintained to assure that each product manufactured is in accord with Federal and State label requirements. The products will be marketed under the "Gro-More" and "White Diamond" brand names.

D. R. Stoneleigh, manager of the Agricultural Specialties Branch of the Agricultural Chemicals Division, will have charge of the sales and distribution of products from the three new plants which are said to be as modern as current chemical and engineering technology can achieve.

New Kraft Bag Plant In Full Operation



Airview of the pulp and paper mill of St. Marys Kraft Corporation and the new conversion plant of Kraft Bag Corporation now in full operation at St. Marys, Georgia. In foreground is the new Kraft Bag factory, where heavy-duty, multi-wall shipping sacks are produced for manufacturers of clay, talc, fertilizers and insecticides, as well as other agricultural products. The bags are sewn or pasted, open-mouth or valve types, 2 to 6 ply, and are custom-made to exact specifications.

The mill at St. Marys converts slash pine into pulp, turns out Kraft paper for shipping sacks, wrapping and other paper products, employs over 500 persons. Kraft Bag Corporation and St Marys Kraft Corporation are subsidiaries of Gilman Paper Company, which also operates a large paper mill at Gilman, Vermont, where Kraft Bag Corporation likewise operates a conversion plant.

MEETINGS

Chemical Specialties Manufacturers' Association, Drake Hotel, Chicago, Ill., June 12, 13.

The National Fertilizer Association Greenbrier Hotel, White Sulphur Springs, W. Va., June 12-14.

Pacific Slope Branch, A.A.E.E., Hotel Casa del Rey, Santa Cruz, Calif., June 14, 15 & 16, 1950.

Pacific Division, APS, Salt Lake City, Utah, June 21-23.

North Central Division, APS, Michigan State College, East Lansing, Mich., June 22-24.

American Plant Food Council, The Homestead, Hot Springs, Va., June 29-30, July 1 & 2.

National Shade Tree Conference, Syracuse, N. Y., Aug. 21-25.

California Fertilizer Association, Coronado Hotel, San Diego, Calif., November 2-4.

American Association of Economic Entomologists, Denver, Colorado, Dec. 18-21.

•

Kolker Expands in Texas

Kolker Chemical Works, Inc., Newark, N. J., has announced the purchase of twenty-five acres of land in the Houston, Texas area where the company plans to erect a plant for the manufacture of agricultural chemicals and organic chemicals for industry. The Houston site was chosen because of the availability of raw materials and the location of markets for finished products. Kolker Chemicals are basic manufacturers of DDT, 2,4-D and 2,4,5-T at the Newark, N. J. plant.

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Purdue Fertilizer Report

Purdue University College of Agriculture, LaFayette, Ind., has issued its revised station circular 162 giving fertilizer recommendations for Indiana field crops. The information contained in the booklet includes fertilizer grades and ratios used in the state; the use of substitute analyses, and minor elements. Crops discussed

Reduced Packaging Costs...

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THE USE OF CELITE* 400 may save you up to 2¢ per pound on every pound of toxicant you grind. You'll find that Celite's high absorption properties permit grinding of higher concentrate poisons . . . and that the net result is lower costs all along the line.

Here are some of the ways in which Celite 400 can help you save:

Reduced grinding costs: Because of Celite's higher liquid absorption properties (more than twice its weight of water), you can grind up to 70% DDT mixtures. High concentrates of BHC and other low melting point poisons may also be ground with Celite.

Reduced packaging costs: The higher strength primary grinds made possible by the use of Celite 400 enables the packaging of more toxicant per unit package.

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In addition to economy, Celite 400, used as the sole primary grinding aid, gives greater kill power to the toxicant. As the absorbing agent for liquid poisons, too, Celite 400 produces highly concentrated dry dusts at the lowest possible cost. For further information, write Johns-Manville, Box 290, New York 16, N. Y.

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Inertness: Compatible with insecticide and fungicide poisons
Suspension: Excellent in both air and water
Composition: Celite is amorphous diatomaceous silica (SiO_2)

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Johns-Manville CELITE 400

Hyman Ordered to Pay

Julius Hyman Company, Denver, was ordered on May 11, to pay to Velsicol Corp., Chicago, a total of $1,723,180 in a suit which has been in litigation for two years. Judge William A. Black of the Federal District Court at Denver ordered Hyman to pay Velsicol as follows: Profits between March, 1947 and March, '49, $1,559,060; damages, $100,000; salaries allegedly received by Velsicol employees while on the Hyman payroll, $47,878; a loan of $15,124 made by Dr. Hyman from the concern's profits; dividends on Hyman stock received by certain employees, $1,118.

The court also ordered the Hyman company to pay $5,000 to an attorney for services as a special master appointed by the court.

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Frisselle to Dow Position

Parker Frisselle has been named manager of Market Research for The Dow Chemical Company, Midland, Mich., according to an announcement by Donald Williams, Director of Sales.

•

U. S. Responsible in Blast

That the Federal Government is responsible for the Texas City ammonium nitrate explosion in 1947, was decided by Federal District Court in Houston, Texas, April 13. Some 273 lawsuits totaling $200,000,000 have been filed it is reported. Judge Kennerly, presiding at the trial, termed the methods of handling ammonium nitrate fertilizer, as "shocking."

Monsanto Chemical Co., St. Louis, whose entire Texas City plant was destroyed in the blast and fire, had filed the largest suit: damages to the extent of $50,000,000.

A government spokesman said that the decision will be appealed to the Circuit Court of Appeals, Ft. Worth, and that the case may be taken to the U. S. Supreme court if necessary.

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Air Purification Device

Air Purification Service, Newark, N. J., has perfected a device for the distribution of triethylene glycol vapor in poultry houses, as a means of air sanitation. Literature on the device is available from the company, 82 Plane St., Newark 2, N. J.

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Fertilizer Bids Received

Bids for 86,500 tons of ammonium superphosphate for Korea were to be opened on May 8; and bids for 25,000 tons of ammonium sulfate for China were to be opened on May 11. Under ECA rules, nitrogen fertilizer for export may come from the U. S., Canada, Latin America, Western Germany or Belgium. Minimum nitrogen content is 16%.

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Jim O'Neal Joins Agco

E. J. O'Neal, entomologist, formerly with the New Mexico State Extension Service at State College, N. M., has recently joined Agricultural Products Co., wholesale brokers and processors of fertilizers, insecticides and agricultural chemicals, Anthony, N. M.

Named CSC President

J. ALBERT WOODS

Above: J. Albert Woods, elected president of Commercial Solvents Corporation, New York, April 12. Mr. Woods has a long background in agricultural chemicals, having been previously connected with Wilson & Toomer Fertilizer Co.; Armour Fertilizer Works; the Chilean Nitrate Sales Corporation; and W. R. Grace & Co.

Kansas Group to Control Weevil Losses

THE "Kansas Wheat Quality Council" was organized recently to work out means of cutting weevil losses in stored grain during the coming season. A record amount of grain is to be stored in the state, officials anticipate, and the new organization, consisting of representatives of 25

Dean L. C. Williams, Director of Extension, Kansas State College (left) and Jess B. Smith, President, Kansas Wheat Improvement Association (right) discuss the major features of the insect control program for stored grain in Kansas. Funds for the poster shown in the rear were provided by a group of companies doing commercial fumigating work.

major agricultural interests in the state, expects to launch an effective control program. These organizations include the Kansas State College, Kansas Farm Bureau, the U.S.D.A., Kansas State Boards of Agriculture and Health, Kansas Wheat Improvement Association, railroads and agricultural chemical dealers.

Officers of the organization are: Herman Praeger, President, Kansas Farm Bureau, Chairman; Roy Freeland, Secretary, Kansas State Board of Agriculture, Vice Chairman; and Cliff E. Skiver, Director, Kansas Wheat Improvement Association, Secretary-Treasurer. The Executive Committee consists of the above-named officers plus Jim Dean, Farmers Cooperative Commission Company and Herb Clutter, Western Kansas Development Association.

The stored grain insect control campaign is divided into two parts: 1) Clean-Up and Spray; 2) Fumigation. The first part of the campaign was to get underway April 20th to continue through May. It consists of series of news stories, radio releases, insect control posters, letters and special District Training Schools for County Agents to be followed by community schools for wheat growers.

The fumigation part of the program will start July 1st and continue until August 1st. Every grower and handler of grain will be urged to fumigate during August or early September. Another series of training schools will be conducted in districts during this period.

Authorities say grain storage losses due to weevil in Kansas have run as high as eight million dollars in one year. Greatly reducing these losses as well as improving the quality of the flour made from Kansas wheat, is the major objective of this program.

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Texas Fertilizer Fire

A large warehouse of the Jacksonville, Texas, Fertilizer Co. was heavily damaged by fire on March 22. Henry Taylor, plant manager, stated that the 30 x 40 ft. corrugated iron building was about two-thirds full of fertilizer material. The fire was reported to have started from a trash fire near by.

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AMA Pesticide Committee

The American Medical Association has announced the appointment of a committee on pesticides to study the health problems associated with the use of insecticides, fungicides, rodenticides, herbicides and other types of economic poisons. The Committee will operate in connection with the AMA's Council on Pharmacy and Chemistry.

Members of the committee are: Herbert K. Abrams, M.D., Berkeley, Calif.; E. M. K. Geiling, M.D., Chicago, Ill.; Albert Hartzell, PhD., Boyce Thompson Institute for Plant Research, Yonkers, N. Y.; Culver S. Ladd, B.S., Council on Foods and Nutrition, Silver Springs, Md.; Arnold J. Lehman, M.D., Food and Drug Administration, Washington, D. C.; S. A. Rohwer, Assistant Chief,

Bureau of Entomology and Plant Quarantine, U.S.D.A., Washington; S. W. Simmons, Ph.D., U. S. Public Health Service, Savannah, Ga.; Justus C. Ward, Chief, Pharmacology and Rodenticide Section, Insecticide Div., U.S.D.A., Washington; Torald Sollmann, M.D., Cleveland, Ohio; and Bernard E. Conley, R.Ph., Chirago, secretary of the committee.

•

Hoyt to Head B.E.&P.Q.

Avery S. Hoyt has been appointed chief of the Bureau of Entomology and Plant Quarantine in the U. S. Department of Agriculture, Dr. P. V. Cardon, ARA Administrator, announced on April 25. The appointment became effective immediately. Mr. Hoyt has served as acting chief of the Bureau since the death of Dr. P. N. Annand on March 29. He has been associate chief since 1941.

As reported in April *Agricultural Chemicals*, Mr. Hoyt is a native of San Diego, California, and holds a B.S. degree from Pomona College. He was first employed by the State of California in horticultural quarantine work, but in 1921 resigned and went into business for himself. In 1928 he rejoined the State Department of Agriculture and became its Director. In 1931 he joined the U.S.D.A. and in 1934 became assistant chief of the new Bureau of Entomology and Plant Quarantine. He was named associate chief in 1941.

•

Enlarges Fertilizer Plant

Waldo Fertilizer Works, Magnolia, Arkansas, has recently enlarged its plant by erecting a $10,000 addition 70 x 72 feet. The plant produces from 150 to 200 tons of mixed fertilizer daily with some 25 employees. The new plant had been under construction for four months.

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Asks Fertilizer Bids

Bids for sale of more than 135,000 tons of fertilizer for export to the Far East were to be received by the U. S. Government around the middle of May. The Economic Cooperation Administration sent out invitations for bids on 24,000 tons of nitrogenous fertilizer for Korea early in the month. These bids, expected to total more than $4,800,000 in ECA funds, were to be opened on May 17.

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Dr. Craighead Retires

The U. S. Department of Agriculture has announced the retirement of Dr. F. C. Craighead who for 27 years was in charge of investigations on forest insects. The retirement became effective on May 1. D. E. Parker, assistant leader of the Division for the past three years, has been named acting leader pending appointment of a successor to Dr. Craighead.

DR. F. C. CRAIGHEAD

The retiring leader entered federal service in 1910. He holds a B.S. degree in forestry and biology from Pennsylvania State College and an M.S. and Ph.D. from George Washington University. A native of Pennsylvania, he took an early interest in the insects that destroy trees and forests, and continued such studies for the remainder of his active life. He is now returning to a farm in the general vicinity of his boyhood near Craighead, Pa.

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C.S.C. Appoints Sanders

Howard L. Sanders, Treasurer of Commercial Solvents Corporation, was appointed a vice president at a recent meeting of the C.S.C. Board of Directors. Mr. Sanders' new title will be Vice President and Treasurer. He has been associated with Commercial Solvents since 1933 when the company acquired Rossville Commercial Alcohol Corporation, of which he was Assistant Treasurer. He has been Treasurer since 1939.

California Fertilizer Assn. in New L. A. Location

Step into the new offices of the California Fertilizer Association, 4700 District Boulevard, Los Angeles! Above is a view from office of the Executive Secretary into the outer office and reception room.

The CFA has leased the entire mezzanine floor of the building, three rooms of which have been finished for use of the Association itself. The balance of the space will be utilized in part by the new Soil Improvement Council, and probably by the newly-organized group of California fertilizer salesmen.

Insecticides Poison Soil? "Not so," says USDA

THAT "continued use of present insecticides is reducing crop yield year by year and may make soil unproductive within ten to fifteen years" was the general theme of a lengthy news story in the New York *Journal of Commerce*, April 18. The story, apparently based on statements made by "USDA experts," went into great detail warning the public of the dark days ahead. It pointed out that "poisoning (the soil) results from the accumulation of technical BHC which volatilizes slowly in the earth, and from technical DDT, which does not break down even after five or six years.

At the recent meeting of the National Agricultural Chemicals Association in Atlantic City, Dr. F. P. Cullinan, assistant chief of the U.S.D.A. Bureau of Plant Industry, Soils and Agricultural Engineering, told the group that the bureau does not release such information officially, because of the danger of over-emphasis to make sensational headlines.

Asked where he received the information for his story, George Cheely, J of C writer, stated that it stemmed from the U. S. Department of Agriculture. Dr. Arthur C. Foster of the Bureau of Plant Industry Station, Beltsville, to whom Mr. Cheely had talked before writing his story, indicated that no one at Beltsville had seen the copy before publication. Thus there was no opportunity to add qualifying statements to the material used, he said, with the result that the whole story was "improperly presented." Dr. Foster indicated that although most of the facts were correct, the story implied that wherever DDT or BHC are used, soil poisoning will result. "This is not true," Dr. Foster emphasized, pointing out that only under certain conditions such as when three heavy doses of DDT are applied to corn during each of three annual growing seasons in the south, is real trouble likely to occur. "The article gave the impression that soil poisoning is a general condition," he observed.

Dr. Foster declared that although tests have indicated that DDT is stable in the soil and is toxic to some plants, methods of overcoming these conditions are being worked out and that there are no grounds for presenting any "scare" stories on the subject.

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New Pest in Connecticut

A new scale insect, which is causing serious damage to red pine plantings in the southern part of Connecticut has been discovered and identified by Dr. George H. Plumb, entomologist at the Connecticut Agricultural Experiment Station.

The insect has been identified as a species of *Matsucoccus*, a type of which two species are already known in the Northeast. The possibility of chemical control will be one of the next studies attempted by the Connecticut Station.

California Weed Conference at Pomona

By Walter S. Ball

A WELL-ROUNDED program was featured at the second annual California Weed Conference held at Pomona College, Pomona, California, April 4-6. Nearly 300 registered at the conference which was held jointly with the Southern California Weed Control Regulatory Officials.

Officials of the three California agencies having to do with weed control work spoke at the opening session. These included Charles V. Dick, chief, Division of Plant Industry, California State Department of Agriculture, Sacramento; W. W. Robbins, Agricultural Experiment Station, Davis; and John J. McElroy, Assistant State Leader of Farm Advisors, U. of California, Davis. Each discussed the part played by his respective agency in the weed control program, and outlined objectives and future plans.

The afternoon session, under the chairmanship of A. S. Crafts, University of California, featured papers on different phases of weed control. These included "Research in Weed Control" by Virgil H. Freed, Oregon Agricultural College, Corvallis; "Brush Control," by Harold H. Biswell, University of California; "Weed Control in Field and Truck Crops," by W. A. Harvey, U. of California; and a two-part discussion on "Weed Control in Orchards and Vineyards." Paul W. Moore, Azusa, Calif., discussed non-tillage practices, and Ethelbert Johnson, Calif. Dept. of Agriculture, Pomona, discussed herbicides.

An evening question-and-answer session brought out numerous discussions on types of herbicides, application methods and other details such as proper timing and precautions to be observed in weed control. Dr. Crafts was chairman of this session, and three other discussion leaders took part. These were: Louis C. Erickson, Calif. Experiment Station, Riverside; Murray R. Pryor, State Dept. of Agriculture, Sacramento; and Norman B. Akesson, Univ. of Calif, Davis.

Planes Exhibited

MT. San Antonio Junior College was the scene of the second day's meeting. Airplane applicators were on display, and the different arrangements of nozzles and booms were inspected along with various types of pumps and other equipment. Following the ground inspection, four planes took off to demonstrate how herbicides may be applied accurately to a given area. A helicopter was also in the air to show its maneuverability, particularly on steep hillsides which are difficult to reach by fixed-wing aircraft. Later, the group met in the college gymnasium to hear explanations on how the equipment operates, and a discussion on design and specifications of spray equipment. A barbeque, furnished by manufacturers of chemicals and application

equipment, was attended by some 400 persons in the evening.

The final day's program featured discussions of industrial and aquatic weed control, under the chairmanship of Ed Cox, Santa Ana, Calif.

A business session was held, with election of the following officers: Dr. A. S. Crafts, president; Murray R. Pryor, Sacramento, vice-president; and W. A. Harvey, University of California, Davis secretary-treasurer.

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Krausche in Pennsalt Post

Pennsylvania Salt Mfg. Co., Philadelphia, has announced that Kenneth K. Krusche is in charge of the recently-created technical advisory section of the Agricultural Chemicals Department. Arthur F. Bixby, Sales Manager for the Department, reports that Mr. Krausche was formerly District Sales Manager for the Agricultural Chemicals Chicago district, and before that time had served as a sales representative in the midwestern area. Mr. Krausche is a native of Brooklyn, and a graduate of Rhode Island State College with a master's degree in agricultural biochemistry.

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Phillips Combines Depts.

K. S. Adams, president of Phillips Chemical Company, a subsidiary of Phillips Petroleum Company, has announced that the manufacturing operations and sales functions of Phillips Chemical Company have recently been combined under the supervision of G. W. McCullough, vice president and general manager at Bartlesville, Oklahoma.

McCullough

Wash

The fertilizer sales division will continue under the management of L. H. Wright. George Wash has been appointed assistant manger of fertilizer sales.

H. L. Hays, former manufacturing superintendent is now assistant to McCullough. R. M. Wallace, formerly superintendent of Plains butadiene plant at Borger, Texas, is superintendent of manufacturing operations, succeeding Mr. Hays.

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To Washington Post

Dr. Kenneth E. Maxwell, a consultant on agricultural chemicals for E. I. du Pont de Nemours & Co., Inc. at Sunnymead, California, has been added to the staff of the du Pont Agricultural Product Development Section, at Yakima, Washington. He will do field development work in that region this summer and will take charge of the office in the fall, succeeding Matthew A. Vogel, who will be transferred to the company's Station at San Jose, Calif.

Pacific Slope AAEE Meets

The 34th Annual Meeting of the Pacific Slope Branch of the American Association of Economic Entomologists will be held at Santa Cruz, California, June 14-16. Headquarters for the meeting will be at the Casa del Rey. Program chairman Stanley F. Bailey, University of California, Division of Entomology, Davis, states that although the program was not completed at press time, a number of speakers had agreed to appear on the program to discuss topics of immediate interest to entomology.

Subjects to be discussed will include reports on the Food and Drug Administration hearings in Washington; recent findings in Oriental Fruit Fly research; legal aspects of pest control; modern extension entomology; and new types of spraying equipment for 1950 and '51.

Special entertainment will be provided for the ladies present, and the annual banquet will be held on Thursday night according to Leslie M. Smith, University of California, Davis, secretary of the group. Chairman of the Pacific Slope Branch is H. M. Armitage, Sacramento, Calif.

HEARINGS

(Continued from Page 65)

of fruits and vegetables in their respective states, was presented by Dr. Henry W. Thurston, Jr., professor of plant pathology, Pennsylvania State College; Dr. Thomas Sproston, assistant professor and associate professor of plant pathology, University of Vermont; and Dr. Dwight Powell, assistant professor of plant pathology, University of Illinois.

Dr. John Heuberger, in charge of the Department of Plant Pathology of the University of Delaware, discussed the necessity of fungicides for the control of plant diseases of specific fruits and vegetables.

Dr. McNew resumed the stand at this point and presented residue data on mercurial sprays used on apples. His testimony was concluded with a summation of the testimony which had been presented by the witnesses who appeared upon behalf of the American Phytopathological Society.

The last witness heard before the presentation of evidence by company witnesses was Mr. J. I. Rodale, owner and editor of "Organic Gardening" magazine. Mr. Rodale presented testimonty relating to the broad subject of use of chemical fertilizers and insecticides and fungicides in the production of food. In this testimony he attributed many of our pest control and health problems to the use of these chemicals. During cross-examination, Mr. Rodale readily admitted that growers would still have insect and plant disease problems even if the best organic gardening procedures were followed and that, accordingly, it would be necessary at times to use insecticides and fungicides. He stated that he could not oppose the use of poisonous or deleterious sprays if they were used in such a manner that no injury to the public health would result.

Allen B. Lemmon, Bureau of Chemistry, California State Department of Agriculture, who first testified on February 20, again testified and presented data on copper and zinc residues on celery.

Testimony under Part A of the hearing, relating primarily to necessity of use of chemicals in the production of fruits and vegetables, will be concluded in the latter part of May. It is believed that the evidence which has been presented in this part of the hearing can leave no question but that without the regular and consistent use of insecticides and fungicides, it would be impossible to produce an adequate supply of high quality fruits and vegetables for the American consumer. It is also believed that this evidence establishes the fact that the concentrated production of fruits and vegetables which is necessary in order to meet the ever expanding requirements of the American market will increase insect and disease problems. To cope with these problems, the grower must be free to select the best insecticide or fungicide available to him.

New Dow Fungicide

Dow Chemical Co., Midland, Mich., is currently introducing a new fungicide, "Thiodow," said to show excellent results on potatoes, tomatoes, celery and certain other vegetables and ornamentals. The new product is in liquid form. It contains disodium ethylene bisdithiocarbamate which becomes zinc ethylene bisdithiocarbamate when zinc sulfate is added to the spray tank.

MALEIC HYDRAZIDE

(Continued from Page 36)

Young white turnip, yellow crook neck and long green squash, watermelon and muskmelon were sprayed with 0.25% maleic hydrazide. One month after treatment turnips were slightly stunted and their leaf surface wrinkled. Squash plants were slightly stunted. Flowers were not present, though abundant on untreated plants, and new foliage was noticeably chlorotic. Flowers developed later in the season and harvested squash appeared to be normal. Watermelon and muskmelon were visibly not affected.

White and Kennard (1950) delayed blossoming of strawberries with maleic hydrazide and treated raspberry plants matured their fruit 16 to 23 days later than untreated plants. Their report together with these observations on delayed blossoming of squash, indicates that maleic hydrazide might be useful for timing the development of some crops.

The dodecylamine salt of maleic hydrazide at 0.25% severely stunted watermelon and muskmelon for ten days and growth was then resumed to equal untreated plants at the end of one month. This reaction indicates that other amine and metal salts of maleic hydrazide may produce plant effects different from that resulting from application of the diethanolamine salt.

Conclusion

MALEIC hydrazide shows a selective herbicidal and growth inhibitory effect on plants. Young plants are more susceptible. Older plants may fail to develop seeds or rhizomes and show less effect on vegetative growth. The chemical appears to be translocated to affect differentiating tissues either temporarily or permanently, depending on the dosage used.

Preliminary data indicates that maleic hydrazide might be useful as a selective grass herbicide, as a temporary inhibitor of plant growth and as a method of preventing formation of undesirable seed and sprouting of tubers in storage.

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CHEMICALS & YIELD

(Continued from Page 70)

was applied; runner peanuts yielded 369 to 1,589 pounds per acre more than undusted plots. Based on the experiments it was recommended that four dustings of 2½ percent DDT or 10 percent toxaphene be made at 10-day intervals, for leafhopper control, with final application one month before harvest. The insecticide, states the report, should be blended with a mixture containing 3.4 percent copper and 65 percent sulfur, or with dusting sulfur.

In studies on control of fruit and foliage diseases of tomatoes the yield of marketable tomatoes was increased by use of "Parzate" dust from 5 to 8.8 tons per acre and to 8.9 tons per acre by use of "Copper A" dust. No significant increase resulted from use of "Dithane D-14" spray, or Bordeaux spray, 4-4-50. In another plot, "Parzate" dust and "Copper A" dust treatments resulted in 5.2 tons of tomatoes per acre, while the check plot produced only 3.1 tons.

Average annual yield of mature crimson clover seed was increased from 90 lbs. per acre to 850 lbs. per acre, the Alabama station reports, by annual application of 10 to 15 lbs. per acre of borax, in addition to 300 lbs. per acre of an 0-14-10 fertilizer. These results were obtained by hand harvesting and are somewhat higher, it is pointed out, than if obtained by combining or by mowing and threshing. Vegetative growth, as measured by weight of dry crimson clover straw, was increased only 36 percent, or from 2,885 lbs. to 3,912 lbs. per acre.

Other sections of the Alabama reports deal with results from use of seed treating chemicals, soil fumigants, defoliants and fertilizers on various crops.

NAC MEETING

(Continued from Page 39)

Mr. Sunderland reviewed the steps taken by the association in coping with current legislative problems, stating that the industry is presenting its position on matters affecting the use of its products.

Mr. Noone reminded that there is a strong trend in state legislation, toward more regulation and that certain bills, if adopted by various legislatures, could impede interstate sales to a serious extent. Dr. Smith urged industry to maintain a constant vigil on all matters of legislative nature so that ample oppor-

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tunity may be available for a presentation of pertinent facts.

Public Relations

FINAL event of the meeting was a five-man forum on public relations, headed by Wallace S. Moreland, Rutgers University, New Brunswick, N. J. Other members of the group included Eugene E. Perrin, Dow Chemical Co., Midland, Mich.; M.R. Budd, Hercules Powder Co., Wilmington, Del.; C. Harold Cunningham, Rohm & Haas Co., Inc., Philadelphia; and Donald G. Lerch, Jr., NAC Association, Washington.

Mr. Moreland, in introducing the topic, recalled the war-time struggle of the industry to fulfill its obligations, stating that the public knew practically nothing about the industry. The need became evident, he said, for industry to have a voice, and this requirement is now being met. Mr. Lerch reported that a good job of education is being done by various agricultural publications which reach millions of farm readers with accurate information about pest control and the problems involved.

Mr. Budd told how the cotton growers are being alerted to the need for buying their pesticide supplies early, and how dozens of influential media are reaching the growers with important information on how to control pests effectively. Radio programs, newspapers, pamphlets, extension bulletins and even banks and loan companies are urging farmers to keep enough pesticide material on hand to suffice for at least one or two applications.

That inaccurate publicity can damage the industry was pointed out by Mr. Cunningham in his talk. He said that the better educated the farmer is, the less likely he is to err in using the agricultural chemicals he has on hand. He said that criticism of the industry is largely unfounded, but even so, it sometimes carries weight with the grower unless he knows how to choose and use pesticides properly.

Mr. Perrin presented an exhibit of bulletins, pamphlets, magazines and news releases which are published regularly by members of the trade. Some of these have wide circulation among rural families, he said, and declared that the total impact of this literature is going a long way toward giving proper instruction to the user.

FUNGICIDES

(Continued from Page 54

heterocyclic nitrogen compounds were assayed. Test organisms were *Stemphylium* (*Macrosporium*) *sarcinaeforme* and *Sclerotinia fructicola*. An unadorned nucleus containing heterocyclic nitrogen was seldom fungitoxic, he reported, but an exception was acridine. Since quinoline is nontoxic, he pointed out, the toxicity of acridine is probably due to the *o*-quinoid structure in the middle ring. Similarly, phenothiazine is nontoxic, but toxicity may be imparted to it by con-

verting the end ring to a *p*-quinoid structure as in phenothiazone, methylene blue and thionine. Conversion of the nitrogen in a nontoxic nucleus to a quatenary ammonium form, imparts strong fungitoxicity. Chlorination seldom confers fungitoxicity on a heterocyclic nucleus, but the addition of polar groups such as NH_2, OH, NO, COOH often does. The addition of a fatty acid side chain to a toxic nucleus may improve fungitoxicity, presumably by conferring lipoid solubility on the molecule.

"Phenolic Fungicides in Agriculture and Industry" was the title of a paper presented by R. H. Gruenhagen, Paul A. Wolf and Edwin E. Dunn, all of Dow Chemical Co., Midland, Mich., They pointed out that the phenolic fungicides have a wide range in both agriculture and the preservation of industrial materials. They are useful because of good fungicidal activity, a wide spectrum of effectiveness against microorganisms, and utility in a variety of fields of application. Although each field of application requires a special combination of physical properties: solubility, vapor pressure, color, odor and persistence, the chemical structure of the phenolics can be altered to meet these special requirements by varying the degree of halogenation and by the formation of derivatives such as salts and esters, yet the basic fungicidal effectiveness of the phenolic structure is retained, the paper stated.

Dr. George L. McNew, Director of the Boyce Thompson Institute, Yonkers, N. Y., presented a technical paper discussing the relationship of chemical structure and physical properties to the fungitoxicity of quinones. He said that "Spergon" is one of the safest and most effective treatments for seed of pea, lima bean, corn and other crops. "Phygon," however, persists better on foliage and fruit so is preferred as a spray material. Benzofuroxan and 9,10-phenanthraquinone are excellent fungicides but are not used commercially because of skin-irritant properties and cost, respectively, he said.

The final paper on the program was prepared by Fred R. Whaley, Linde Air Products Co., Tonawanda, N. Y., and John B. Harry, Carbide & Carbon Chemicals Div., Union Carbide and Carbon Corp. New York, discussing chromate complexes as fungicides. Laboratory tests have been promising, they reported, with synergism being shown between copper and the chromates, and zinc and the chromates. Field tests on potatoes show chromates alone not as good as copper alone, but synergism between the two is confirmed. The copper-zinc chromates are particularly effective on potatoes, it was stated. A mercury-zinc chromate is particularly effective as a seed treatment, especially on corn. In some large demonstration plots in Iowa it gave larger yields than any commercial treatment. A calcium-cadmium-zinc-copper chromate has proved effective in the control of "Dollar Spot" on bent grasses. Beside being easy to handle, the authors point out, the chromates have the general advantage of being noncorrosive to containers and spraying equipment.

1951 Weed Meeting Called

The 1951 meeting of the Northeastern Weed Control Conference has been announced by Walter C. Jacob, secretary-treasurer of the group. The time has been set for January 3, 4 and 5, and the place will be the New Yorker Hotel, New York City. Other officers of the Conference are H. L. Yowell, Esso Laboratories, Linden, N. J., president, and S. M. Raleigh, Pennsylvania State College, State College, Pa., vice-president.

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Spray Bulletin Issued

"Spray Programs for Insects and Diseases of Tree Fruits in Eastern Washington" is the name of extension bulletin No. 149 recently issued by the State College of Washington, Pullman. A comprehensive warning against careless use of the organic phosphates, and full instructions about proper safety measures are presented. Complete information for control of numerous pests, both insect and plant disease, is given, with tables on residue limits, proper timing and other suggestions for satisfactory results. The book was prepared by representatives of the Experiment Stations and the Extension Service of the State College of Washington, and the state department of Agriculture.

COTTON INSECTICIDES

(Continued from Page 32)

Effect on Flavor, Odor

THE effect on flavor of potatoes, carrots, and certain other root crops of their growing in soils containing benzene hexachloride is well known. Heavy applications of benzene hexachloride on a cotton field should therefore be avoided if that field is likely to be used for Irish potatoes, carrots, onions, and certain other truck crops.

Effects on Stored Foods

ALL insecticides should be plainly labeled, and kept out of reach of children and animals, and where they will not be accidentally confused or mixed with food or feed, as has been mentioned many times previously. Insecticides should be stored separately from foods and feeds to avoid contamination and to protect against absorption of undesirable flavors or odors. Critics of the use of insecticides are numerous. They are disposed to distort the facts and to overlook the tremendous benefits that have been derived from their use.

There are numerous hazards in the use of cotton insecticides—similar to those involved in crossing a busy street. The needed factor is an awareness of these hazards and the universal adoption of safeguards. The object is certainly not to frighten people so that they will not use pesticides, but to get them to adopt proper precautions. The intelligent use of

pesticides will enable users to derive the greatest good with the least chance of adverse effect.

The use of more insecticides is desirable, but only when and where required and in the proper formulations and dosages. This matter of cotton insect control is not an entirely simple one. It is so important to the South and to the entire nation as to require the best thought and effort in solving the problems involved.★★

ALABAMA COURSE

(*Continued from Page 57*)

tions, uses, and limitations of insecticides used or likely to be used on cotton. He also presented results of 1949 control experiments, showing gains of 766 to 1,243 pounds of seed cotton per acre from proper control. W. A. Ruffin, Extension Entomologist, outlined rather detailed procedures for effective cotton insect control. Approved procedures he mentioned included dusting or spraying during the time the cotton crop was being set and matured. Three per cent gamma BHC-5 per cent DDT dust, 20 per cent toxaphene dust, calcium arsenate with a suitable aphicide, toxaphene emulsifiable concentrate, and toxaphene-DDT emulsifiable concentrate were recommended materials. Aldrin and dieldrin showed promise in 1949 experiments, but are not yet recommended for general use on cotton in Alabama.

Talks on Peanut Pests

ANOTHER subject of major importance was the control of diseases and insects of peanuts, a crop second only to cotton in its requirements of insecticides and fungicides. Dr. Coyt Wilson, Plant Pathologist of the Agricultural Experiment Station, spoke on the basic principles of plant disease control and more specifically on the control of leafspots and other diseases of peanuts. Dr. F. S. Arant presented information on leafhoppers, thrips, and leaf-eating caterpillars on peanuts, and Dr. Wilson spoke again to outline the dusting schedule for control of peanut insects and diseases in a single operation. The recommended procedure consists of dusting the peanuts 4 to 5 times during the summer months with 2.5 per cent DDT and 3.4 per cent copper blended with dusting sulphur.

Virgil S. Searcy, Assistant Agronomist of the Alabama Experiment Station, discussed chemical control of weeds. Considerable discussion developed regarding the hazards involved in application of herbicides with aerial equipment.

Other major subjects covered included the following: Recommended spraying and dusting schedules for vegetables, by Dr. R. L. Self, Associate Plant Pathologist, Agricultural Experiment Station; control of diseases of small grains and legumes, by J. A. Lyle, Assistant Plant Pathologist, Agricultural Experiment Station; corn insects and their control, by W. G. Eden, Assistant Entomologist, Agricultural Experiment Station;

defoliation of cotton, by E. H. Wilson, American Cyanamid Company, Montgomery, Ala.

Professor Robert G. Pitts, Head of the Department of Aeronautical Engineering, was moderator at a panel discussion on the legal aspects of airplane dusting and spraying. Cotton farmers present were disturbed by reports of court cases holding farmers liable for damage done by dusting-pilots employed by the farmer. At the close of the discussion, a committe of airplane-dusting pilots was appointed to study and make recommendations to the State Department of Agriculture regarding licensing and bonding of aerial applicators.

A banquet held the night of March 20 was featured by a movie on the mechanization of cotton production in Alabama. This movie was presented by C. M. Stokes, Associate Agricultural Engineer, and T. E. Corley, Assistant Agricultural Engineer, Agricultural Experiment Station. The movie included ground and aerial application of dusts and sprays to cotton.

Presiding at various sessions of the short course were Asa Rountree, Director of the Alabama Department of Aeronautics; L. H. Smith, President of the Alabama Flying Farmers Association; and George R. Williamson, Manager of the Agricultural Sulphur and Chemical Company, Montgomery, Ala.

INSECT SITUATION

(*Continued from Page 64*)

seriously infesting pepper in that State.

The beet leafhopper was infesting cantaloups in increasing numbers in the Salt River Valley of Arizona toward the end of March.

The vegetable weevil, larvae of the green June beetle, and midge larvae continued to injure tobacco plant beds in South Carolina during the early part of March. Midge larvae and the vegetable weevil were also reported attacking some tobacco plant beds in Wayne County, N. C., toward the end of the month, while aphids were attacking tobacco plant beds in Georgia and Florida. In some instances, insecticides were applied in the latter State to control aphids in the tobacco plant beds and in fields where shade-grown tobacco plants had been set out.

FUNGICIDES

(*Continued from Page 61*)

tions for the week of July 18 were very low (Tables 1 to 3). The average of the counts for replicates of each treatment ranged from .4 to 2.5 infection centers per treatment. The number of centers increased slowly and for the week of August 29 had increased to averages, in the replicated plots of each treatment, ranging from 3.0 to 13.0. This range includes all the fungicides in the three groups together with the untreated plots for

each group. For the plots receiving 1 to 4 the counts for the week of September 5 held to a low level. For the dusted plots and those receiving sprays 6 to 11 increases in infections are in a pattern similar in many cases to the pattern exhibited by counts of aerial infections in the plots receiving these sprays.

Fungicide control of aerial infections: Aerial infections appeared after midseason in treated and untreated plots, as the vines became heavy enough to shade the soil and produced sufficient foliage to retain the moisture received from irrigation and dews. Only those infections not in contact with the soil were classed as aerial infections. Such infections could have originated only from spores. These infection centers did not appear until the week of August 15. Since plots were planted near the end of May there was an interval of some ten weeks after planting before these aerial infections appeared.

The data from dusted plots (Table 1) indicate that "Zerlate" and "Flotox" reduced infections in comparison with untreated plots. The other fungicides used were little better than no treatment through the month of August. Early in September infections in all plots increased sharply under conditions of lower temperatures and higher humidity especially in the heavily massed foliage.

It appears that all dusting could have been delayed two weeks, from July 25 to August 8, without affecting the degree of control obtained by use of the dust fungicides.

Data for fungicides used in both 1948 and 1949 are presented in Table 2. These data indicate that "Zerlate" plus "Sulforon" was superior to the other fungicides. However, all fungicides in this group greatly reduced infections in comparison with untreated plots.

Data for fungicides not previously used in these experiments are presented in Table 3. They show "Cop-O-Zink" and a mixture of "Fermate" and "Sulforon" to be remarkably effective in reducing the infection level in comparison with untreated plots.

PEA APHID

(*Continued from Page 43*)

The Why of Failures

DURING the past year there have been many complaints by canners in various parts of the country that insecticidal treatments did not give desired results. Failures may be caused by a number of factors, some of which are: (1) poor equipment not adapted to pea treatment; (2) treating under poor weather conditions, particularly dusting during high wind velocity, (3) poor coverage by aerial treatments; (4) treating too late after peas are severely damaged; and (5) use of poor or improper insecticides. Because increasing wind velocity decreases control effectiveness, both aerial and ground dusting operations are most successful when there is no

air movement and no dusting should be done when air movement exceeds 10 miles per hour. Plane treatments with either dust or spray are generally effective only on a swath as wide as the wing spread.

Usually poor results are caused by one or more of the above factors. It has been observed over a period of years in Maryland that best results are secured during seasons of most severe infestation when weather is not favorable for pea growth. Under these conditions highest kills are secured and the period of protection is longest. With less severe infestation and good growing weather, the period of protection is shorter. New foliage is produced so rapidly that within a few days after treatment there may be a foot or more of new growth on which surviving aphids and those migrating into the field rapidly increase in numbers. This condition apparently accurred in parts of Maryland in 1948.

OIL HERBICIDES

(*Continued from Page 49*)

Treated water can be used safely for irrigation. No injury is observed when alfalfa checks are flooded with water that had received an earlier application. Unlike some chlorinated herbicidal chemicals that are heavier than water, the new

aquatic weed killer does not seep into plots planted to row crops and destroy angleworms.

Adoption of this herbicide bids fair to replace the costly "chaining" process. Application costs are about one-third those of chaining, and only half as many treatments per year are required.

Summary—Petroleum oils are being improved for use as weed killers. The increased usage of these products has given rise to a demand for simple tests that can be used as gauges of phytotoxicity. Attempts to correlate the toxicity with the physical and chemical tests commonly used in the oil industry have not yet been entirely successful. Oils are complex mixtures of hydrocarbons and since the toxicity is dependent upon the chemical composition, physical and chemical tests which will serve as indicators of toxicity must define the chemical composition.

Aromatic hydrocarbons are the most toxic constituents of petroleum weed killers. Aniline point, aromatic content or unsulfonated residue tests can be used to estimate the amounts of these materials present. The kind of aromatics can be controlled more closely by limiting the gravity and boiling range. Viscosity is a measure of the sprayability of the oils.

Petroleum products having an aromatic content between 10% and 20% and boiling between 300°F. and 400°F. are satisfactory for use in selectively killing weeds in carrots and other umbelliferous crops. General contact weed killers usually have 40 per cent or more aromatics and boil between 350°F. and 700°F. Diesel fuels with an API gravity of 32° are being used, but better results are obtained with other products having gravities below 25°. Petroleum products with the same general boiling range as the selective herbicides but with an aromatic content above 70 per cent may be used for the control of submerged water weeds in irrigation and drainage ditches and reservoirs.

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Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, 254 W. 31st St., New York 1. Closing date: 25th of preceding month.

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Chemical Salesman: With university, agricultural degree for the sale and promotion of a large manufacturer in the Northern California area. Address Box No. 431, care of Agricultural Chemicals.

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Dr. Howard Dies

Dr. Leland O. Howard, 92, once principal entomologist of the U.S.D.A. and author of "The Insect Menace," published in 1931, died in New York May 1. Dr. Howard's career began in 1878 when he became an assistant in the U.S.D.A. Department of Entomology. He became head of that department in 1894, and continued in this position until 1927. It was the next four years that he served as principal entomologist. He retired in 1931.

Dr. Howard was the recipient of many significant honors, as well as holder of a number of university degrees. The latter included his B.S. and M.S. at Cornell, a Ph.D. at Georgetown and several honorary degrees, notably LL.D's from the universities of Pittsburgh and California, and Doctorates of Science from the University of Toronto and Rutgers. He was honorary curator of the insect department of the U. S. Natural History Museum for some 55 years, and was consulting entomologist to the U. S. Public Health Service for nearly that long. Dr. Howard would have been 93 on June 11.

Industry Patents

2,500,961. METHOD OF PRODUCTION OF DDT. Patent issued March 21, 1950, to Walter H. C. Rueggeberg and W. A. Cook, U. S. Army. In the reaction of the member of the group consisting of anhydrous chloral and chloral hydrate with two mols of chloral benzene to form 2,2 - bis(p - chlorophenyl) 1,1,1 - trichloroethane, the improvement which consists in carrying out the reaction in the presence of a stoichiometric amount of chlorosulfonic acid.

2,501,191. N,N'-POLYTHIOAMINES AS PESTICIDES. Patent issued March 21, to W. D. Stewart and J. H. Standen, Yonkers, N. Y., assignors to B. F. Goodrich Co., New York. A pesticidal composition comprising as the essential active ingredient 10 parts per million to 0.25% by weight of a compound selected from the group consisting of N,N'-dithiodiethylamine, N,N'-trithiodiethylamine, N,N'-dithiodibutylamine, N,N' - trithiodibutylamine, N,N'-dithiodimethylamine, N,N'-dithiodiisopropylamine, N,N'-dithiodiisoamylamine, N,N' - dithiocyclohexylamine, N,N'-dithiocyclohexylamine, N,N'-trithiomorpholine, N,N' - tetrathiomorpholine, N,N'-dithiopiperidine, N,N'-dithiobenzylamine, and N,N'-dithioaniline, said active ingredient being homogeneously dispersed in a nonsolvent fluent carrier.

2,501,260. FERTILIZER MIXER AND DISPENSER. Patent issued March 21, to Arvid Brodin, Los Angeles, Calif. A mixing and dispensing apparatus comprising, in combination, a housing having an opening in the top end thereof, a fluid inlet and a fluid outlet connected into said housing, a ring-shaped member on said top end of said housing along the margins of said opening, a removable cap adapted to be mounted on said housing in engagement with said ring-shaped member, interengaging locking means on said ring-shaped member and on said cap manually operable to detachably connect said cap to said top end of said housing, a container of foraminous material adapted to be received in said housing through said ring-shaped member, and quick-detachable inter-engaging mounting elements on the top end of said foraminous container and the underside of said cap, said mounting elements being entirely separate and independent of said housing, so that said foraminous container is suspended from said cap into the interior of said housing when the cap is mounted on said housing, and is lifted from the housing as a unit assembly with the cap when the cap is disconnected and lifted from the housing, said quick detachable mounting elements permitting said foraminous container to be readily detached from said cap after the two have been removed from the housing in order to permit refilling.

2,501,555. SPRAYING ATTACHMENT FOR WEED CONTROL. Patent issued March 21, to Godfrey L. White, Osceola, Ark. An apparatus for applying a liquid to the stalks of a plant comprising a runner having a leading and trailing end, a conduit leading to a liquid supply tank, a nozzle carried by said conduit, means for retaining said nozzle in adjusted vertical position on the trailing end of said runner, a link pivoted at its lower end to said runner intermediate the ends of the latter, a first resilient means securing the upper end of said link to a prime mover, and a second resilient means interconnecting said first resilient means and the leading end of said runner constantly lifting the leading end of said runner and lowering the trailing end thereof.

2,502,996. FERTILIZERS AND METHODS FOR THEIR PRODUCTION. Patent issued April 4, to L. V. Rohner, deceased, late of Syracuse, N. Y., by Cynthia Ann Rohner, executrix, Syracuse, and Alvin P. Wood, Syracuse, N. Y., assignors to Allied Chemical & Dye Corp., New York. As a new composition of matter granules of ammonium nitrate coated with a urea-formaldehyde resin prepared by reacting formaldehyde and urea in an acidic aqueous solution in proportions forming an insoluble resin which precipitates to form a mixture of mother liquor and resin and maintaining said solution during the precipitation of said resin at temperatures in the range of 40° to 90° C. and under conditions of acidity so correlated with the temperature of the solution that when the solution is at temperatures of 40° to 75° C. the acidity of said solution is maintained at a pH of 3 to 5, and when the solution is at temperatures of 75° to 90° C. the acidity of said solution is maintained at a pH below 6 and above 4.

2,503,452. MANUFACTURER OF DDT. Patent issued April 11, to Ralph S. Park, Swarthmore, Pa., assignor to Allied Chemical & Dye Corp., New York. The process of purifying and stabilizing crude acid containing DDT produced by condensation of chloral with monochlorobenzene in the presence of sulfuric acid as condensing agent, which comprises contacting the crude molten DDT containing sulfuric acid in quantity not above 3% H_2SO_4, with a compound of the group consisting of calcium oxide, barium oxide, magnesium oxide and lead oxide, in substantially dry form, at a temperature in the range of 110° C.—180° C., said compound being employed in excess of that required to neutralize said acidity, filtering the resulting mass at a temperature within the range of 110-180° C. and recovering purified and stabilized DDT as filtrate.

2,502,366. INSECTICIDE BASE OIL TOXICANT. Patent issued March 28, to Warren A. Beman, Albany, and Robert B. Killingsworth and Arthur C. Pabst, Douglaston, N. Y., assignors to Socony-Vacuum Oil Co., Inc., New York. A toxicant for mealy bugs consisting of a mixture of isoparaffinic and paraffinic hydrocarbons obtained by alkylation of C_6 to C_8 isoparaffins with C_4 and C_5 olefins in the presence of a catalyst selected from the group consisting of sulfuric acid and hydrofluoric acid; said mixture having an initial boiling point of about 364° to about 396° F., a 10 per cent point of about 371° to about 413° F., a 50 per cent point of about 383° to about 440° F., a 90 per cent point of about 432° to about 485° F., and a final boiling point of about 470° to 510° F.; said mixture having a gravity of about 48.3 to about 53.2° A. P. I., a viscosity @ 100° F. of about 1.9 to about 2.5 centistokes, a paraffinicity index of about 131.4 to about 151.9 and an unsulfonatable residue of at least 90 per cent; said mixture consisting of about 45 to about 70 weight per cent C_{10} isoparaffinic and paraffinic hydrocarbons and the balance substantially all lighter and heavier isoparaffins and paraffins, and being substantially devoid of aromatic and naphthenic hydrocarbons.

2,504,165. METHOD OF PRODUCING TETRAETHYL PYROPHOSPHATE. Patent issued April 18, to Arthur D. Fon Toy, Chicago, assignor to Victor Chemical Works, Chicago. The method of producing tetraethyl pyrophosphate which comprises associating diethyl halogen-phosphate with water at a temperature of from 0° to 35° C. to form the pyrophosphate ester and hydrogen halide, and removing the hydrogen halide substantially as it is formed, the time of contact of the reactants being limited so that the pyrophosphate ester is not appreciably further hydrolyzed.

2,504,404. MANGANOUS ETHYLENE BIS-DITHIOCARBAMATE AND FUNGICIDAL COMPOSITIONS CONTAINING SAME. Patent issued April 18, to A.L. Flenner, Wilmington, Del., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington. Manganous Ethylene Bis-dithiocarbamate.

2,504,545. GRANULATED FERTILIZER. Patent issued April 18, to Charles E. Waring, Baltimore, and Casimer C. Legal, Jr., Pasadena, Md., assignors to the Davison Chemical Corp., Baltimore, Md. A method of manufacturing a mixed phosphatic fertilizer having a low fluorine content and in a condition suitable for bagging and use, comprising mixing finely divided phosphate rock with sulfuric acid having a concentration of at least 93% H_2SO_4, said phosphate rock and sulfuric acid being mixed in such proportions that at least sufficient sulfuric acid is present to react with the acid reactible constituents in the rock and form phosphoric acid from the calcium phosphate present therein, heating the reaction mixture to a temperature of about 200° C. to 300° C. to form a clinker, grinding the clinker

formed in the heating step, and ammoniating and adding water to the ground clinker to form a mixed fertilizer in a condition for packing without curing.

2,504,546. SUPERPHOSPHATE MANUFACTURE. Patent issued April 18, to Edward H. Wight, Baltimore, and Thomas O. Tongue, Curtis Bay, Md., assignors to the Davison Chemical Corp., Baltimore, Md. A process for the manufacture of a superphosphate fertilizer having a new fluorine concentration from phosphate rock comprising mixing finely divided phosphate rock with about 98% sulphuric acid in acid to rock ratios of about the stoichiometric ratio in which sulphuric acid reacts with the acid reactible compounds in the rock and with the calcium phosphate in the rock to form mono-calcium phosphate, heating the reaction mixture to a temperature of about 250° F. to 500° F. for about one hour, said mixing and heating steps volatilizing about 60% to 75% of the fluorine originally present in the phosphate rock, grinding the heated product, adding water thereto in quantities sufficient to substantially complete the reaction between the sulphuric acid and phosphate rock to effect conversion of the phosphate to the citrate soluble form, and graining the mixture as the water is added to the heated reaction product.

2,504,580. AERIAL SPRAYING APPARATUS. Patent issued April 18, to Roland Pierson, Reedly, Calif. In a device of the character described including an airplane, a fluid tank, and a distributor head positioned along and in spaced relation with the wing of said plane, the combination of a pump connected to said tank and to said distributor head, a power take off from the engine of the plane for actuating said pump, an air inlet in communication with said pump, a plurality of nozzles spaced on said distributor head, a valve for each nozzle, a shut-off valve for said distributor head, and means for actuating simultaneously said shut-off valve and said nozzle valves.

2,504,803. INSECTICIDAL COMPOSITIONS CONTAINING PRIMARY POLYHALOPHENYLETHYLAMINE. Patent issued April 18, to Charles C. Clark, Kenmore, N. Y., assignor to Mathieson Chemical Corp., New York. An insecticidal composition characterized by both knock-down and killing power and containing, as an active insecticidal component, primary polyhalophenylethylamine in which the amino group and the polyhalophenyl group are attached to the ethyl group.

Trade Mark Applications

GENIPHENE, in capital letters, for parasticides, particularly insecticides. Filed Sept. 3, 1948, by Allied Chemical & Dye Corp., New York. Claims use since June 15, 1948.

BLACK FLAG, drawing of flag on slanting flagpole, with words "Bandera Negra" below, for insecticides and disinfectants. Filed Dec. 28, 1948, by Boyle-Midway, Inc., Jersey City, N. J. Claims use since Jan. 31, 1946.

DRAWING OF HERCULES, holding club, for active chemical ingredient for use in the manufacture of insecticides. Filed Feb. 12, 1949, by Hercules Powder Co., Wilmington, Del. Claims use since Feb. 1, 1949.

HERCULES, in Chelt Italic Caps, for the active ingredient for use in the manufacturing of insecticides. Filed Feb. 12, 1949, by Hercules Powder Co., Wilmington, Del. Claims use since Feb. 1, 1949.

POLYBOR, in tall capital letters, for weed control preparation consisting of a mixture of borax, sodium pentaborate and a minor percentage of inert ingredients. Filed Feb. 17, 1949, by Pacific Coast Borax Co., Los Angeles, Calif., assignor to Borax Consolidated, Ltd., London, England. Claims use since Oct. 27, 1948.

MICRO-FLOSUL, in capital letters, for insecticides and fungicides. Filed Feb. 24, 1949, by Central Chemical Corp., Hagerstown, Md. Claims use since Dec. 20, 1947.

PYRENONE, in block letters, for insecticides. Filed Mar. 8, 1949, by U. S. Industrial Chemicals, Inc., New York. Claims use since Mar. 15, 1941.

SOIL SULPHAID, in hand-drawn capital letters, with drawing of a mountain scene below, for mineral fertilizer. Filed Oct. 18, 1948, by Wyoming Sulphaid Co., Bozeman, Mont. Claims use since Aug. 23, 1947.

WEBFOOT BRAND, in white capital letters on solid background, with drawing of duck in center. For fertilizer. Filed Feb. 19, 1949, by Webfoot Fertilizer Co., Inc., Portland, Oregon. Claims use since January, 1945.

GOLDEN WEED, in capital letters, for fertilizers. Filed Mar. 7, 1949, by F. S. Royster Guamo Co., Norfolk, Va. Claims use since Jan. 1, 1929.

FLEURIN, in arch-shaped capital letters, for fertilizers. Filed June 3, 1949, by Alphons Horning Aktiengesellschaft, Berne, Switzerland. Claims ownership of Swiss registration No. 99,938, dated June 23, 1941.

SCARAT, in capital letters, for liquid rodent repellents to be used as sprays. Filed Feb. 24, 1947, by Charles V. Sparhawk, doing business as Sparhawk Co., Sparkill, N. Y.

CHEMISEAL, in hand-lettered capitals, for wood preservative for control of moisture, rot and insects. Filed Oct. 21, 1947, by the Chemiseal Co., Detroit, Mich. Claims use since Jan. 1, 1939.

POWCO, hand-lettered capitals inside of oval, for insecticides, fungicides, germicides, pesticides. Filed Mar. 11, 1949, by John Powell & Co., Inc., New York. Claims use since July 1, 1948.

PAN-THION, in tall capital letters, for insecticides and fungicides. Filed May 5, 1949, by Woolfolk Chemical Works, Ltd., Ft. Valley, Ga. Claims use since March, 1949.

CITIES SERVICE, with shield surrounding a drawn triangle, for insecticides and fungicides as well as for other chemical products. Filed 28, 1948 by Cities Service Oil Co., Bartlesville, Okla. Claims use on insecticides and fungicides since May, 1929.

FARMRITE SUPERGREEN, in hand-lettered capitals, for fertilizers. Filed Aug. 10, 1949, by Central Chemical Corp., Hagerstown, Md. Claims use since May 14, 1948.

GREEN BAY, with the letter "A" greatly exaggerated so that the word "green" appears to rest upon the letter, for plant food. Filed Aug. 24, 1949, by Green Bay Fertilizer Co., Green Bay, Wisconsin. Claims use since May 1, 1949.

GARDEN WITCH, in hand lettered caps and lower case, for insecticide. Filed Jan. 18, 1949, by Interstate Medical Co., Kingsley, Iowa. Claims use since June 1, 1935.

RA-PID-GRO, in hand-lettered capitals, drawn across a leaf, for plant fertilizer. Filed Apr. 27, 1949, by Ra-Pid-Gro Corp., Dansville, N. Y. Claims use since Nov. 1, 1938.

INTERNATIONAL MINERALS, Chemicals, with the first word in script across a circle inside of which are the words "Minerals" and "Chemicals," for fertilizers. Filed May 10, 1949, by International Minerals & Chemical Corp., Chicago. Claims use since April 11, 1949.

INTERNATIONAL MINERALS, Chemicals, (same trade mark as above) for double sulfate of potash and magnesia and for muriate of potash, each used as a fertilizer ingredient. Filed May 7, 1949, by International Minerals & Chemical Corp., Chicago. Claims use since Apr. 12, 1949.

DEVEX "T," in capital letters, for insecticides. Filed Feb. 5, 1948, by Westvaco Chlorine Products Corp., New York. (Now by change of name and merger to Food Machinery & Chemical Corp., New York.) Claims use since Jan. 17, 1948.

TRIVEX-"T," in capital letters for insecticides. Filed Feb. 5, 1948, by Westvaco Chlorine Products Corp. (Same as above.) Claims use since Jan. 13, 1948.

HEXAMITE, in capital letters, with the letter "X" extended to underline the other letters, for insecticides. Filed Apr. 30, 1949, by Food Machinery & Chemical Corp., San Jose, Calif. Claims use since Mar. 2, 1949.

Clarifying S-W Plans

Plans of Sherwin-Williams Company, Cleveland, for continuing and expanding the sale of some of the items in its line of agricultural chemicals are reviewed in an article in the April 15th issue of *Business Week*, which is apparently based on authentic information from company sources. While the Sherwin-Williams Agricultural Chemical Division has been discontinued, the company will continue to sell a number of insecticide and weed control products as well as insecticidal raw materials. These products will be handled in the future by the Pigment, Color and Chemical Division of the company located at 295 Madison Avenue, New York, and headed by B. M. Van Cleve.

Production of 40% 2,4-D "Weed-No-More" has been halted, at least temporarily, but no decision has been made yet as to whether or not the company may possibly re-enter this field at a later date. It might be decided to manufacture and market the product for re-sale by other firms, not under the S-W brand. The 14% 2,4-D product, "Weed-No-More" for the home gardener will continue to be promoted actively. Additional promotion is under way also for three insecticide items in the S-W line, which will be sold through Sherwin-Williams stores and branches. The insecticide line includes "Kil-Tone," for insect control on cotton plants, and "Dimite," for control of orchard pests, which are being marketed commercially this season for the first time, in addition to "Pestroy-25," a three-year-old S-W insecticide for corn borer control. The company is reported planning to broaden its line of insecticide products sold under the "Pestroy" brand.

Sale of arsenical raw materials to manufacturers of agricultural insecticides will also continue.

The Acme White Lead & Color Works, Detroit, a wholly owned subsidiary of Sherwin-Williams Company, will continue as in the past to offer its line of finished insecticidal packaged products which have always been marketed independent of the S-W line.

Advertisers' Index

MAY, 1950

(The Advertisers' Index has been checked carefully but no responsibility can be assumed for any omission)

TALE ENDS

AUTOISTS driving to the recent NAC Association meeting at Atlantic City, were surprised to spot numerous large outdoor posters in New Jersey, proclaiming "Dithane for bonus bushels." The poster pictured a grinning farmer holding an overflowing bushel of potatoes. Potatoes? Who knows what their end may be. But whether they terminate as part of an American family's meal or in kerosene-soaked ignominy, the fact remains that the use of agricultural chemicals does add to the yield of many crops. Farmers aren't dumb, nor are they responsible for the screwy policies being pursued by Washington on the disposal of some agricultural commodities. But they are catching on to the value of pesticides and fertilizer in raising more crops!

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The Federal Trade Commission's report on the fertilizer industry is now printed, and copies are available from the Govt. Printing Office, Washington, D. C., for 35c. Although the FTC allegations have been largely discredited by the industry, the text may be of interest to many.

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Attendants at the recent NAC Association's residue tolerance forum at Atlantic City weren't sure they heard correctly the name of one of the participants. They were sure Ernie Hart said that "Paris Green" would be a member of the panel. Upon listening more closely, however, it turned out to be "Harris Green, Jr.," of Rohm & Haas Co., Philadelphia, who was pinch hitting for F. J. Rarig, also of R. & H., who was ill and unable to attend.

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A few interesting "extras" were in store for the conventioneers, too. Impromptu remarks were spoken by S. A. Rohwer, F. P. Cullinan, and W. G. Reed, all of the U.S.D.A. None of these gentlemen were on the program officially, but their remarks are always welcomed by the Association membership.

PLUM CURCULIO is an annual menace to the peach crop. It decreases the yield of marketable fruit due to pre-harvest drop and injury. To protect the peaches and his profit margin, an orchardist must use a good protective spray.

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BEANS
- Mexican bean beetle
- Onion thrips
- Corn ear worm
- Bean leaf beetle
- Green clover worm
- Flea beetle

CURCUBITS
- Melon worm
- Pickle worm
- Squash vine borer

CRUCIFEROUS CROPS
- Imported cabbage worm
- Diamond back moth
- Cabbage loopers

PEAS
- Pea weevil
- Omnivorous leaf tier
- Pea aphid

CELERY
- Lygus campestris
- Celery leaf tier

ASPARAGUS
- Asparagus beetle

TOMATOES
- Flea beetle
- Colorado potato beetle
- Blister beetle
- Potato aphid

POTATOES
- Colorado potato beetle
- Blister beetle
- Flea beetle

BEETS
- Webworm

LETTUCE
- Corn ear worm

SPINACH
- Leaf tier

BLUEBERRIES
- Blueberry fruit fly

ORNAMENTAL PLANTS
- Box elder bug

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